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CANADIAN PUBLIC HEALTH JOURNAL

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Alberta State Health Insurance Report*

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Secretary, State Health Insurance Commission, Edmonton

IN Alberta, as elsewhere, there has been a steadily growing interest manifested in the socialization of medical services during the past few years. In 1928 a resolution was passed in the Legislature requesting a Governmental enquiry into existing schemes having for their purpose the provision of any medical or allied type of service as a public service. The inquiry was made during 1928 and a report presented to the Legislature in 1929. This report contained a survey of some of the existing schemes dealing particularly with the British health insurance scheme, social insurance in France and Germany and such provision for public health services as obtained in Australia, New Zealand, the United States and the various provinces of the Dominion of Canada. No further action was taken until 1932 when the following resolution was unanimously adopted by the Legislature:

"Whereas arising out of a resolution adopted by the Legislature, information has been collected and presented on the subject of State Medicine and Health Insurance; now, therefore, be it resolved that this Government is hereby instructed to appoint a commission consisting of at least five members of this Legislature for the purpose of:

"(a) Considering and making recommendations to the next Session as to the best method of making adequate medical and health services available to all the people of Alberta;

"(b) Reporting as to the financial arrangements which will be required on an actuarial basis to ensure the same."

A commission was appointed accordingly by Order-in-Council in 1932. This commission presented a progress report which was tabled in 1933 and a final report which was tabled in February of the present year, and of which this forms a brief résumé.

THE FINAL REPORT

The resolution calls for adequate medical and health services for all the people of Alberta, and does not suggest the provision of benefits in cash.

*Abstract of the Final Report as submitted by the Legislative Commission to the Legislature in Session 1934.

The resolution appears to suggest certain definite problems for investigation, namely:

- (1) What would constitute a reasonably adequate medical and health service for the people of Alberta?
- (2) To what extent are the medical and allied services existing in this Province adequate?
- (3) To what extent are existing health facilities available?
- (4) What is the best method of making adequate medical services available to all the people of Alberta?
- (5) How can such a method or scheme be financed?

In order to clarify conceptions regarding certain terms used in the report the Commission has offered its interpretation as follows:

"Medical services", "health services" and "medical facilities" mean all the sciences and arts, institutions and devices, founded on a sound, acceptable, scientific basis, that have for their purpose the prevention and cure of disease.

"State medicine" means a system of medical administration by which the state provides medical services for the entire population, and under which all practitioners are employed, directed and paid by the state on a salary basis.

"State health insurance" means a system of state insurance for health purposes. Under such a system a non-profit earning, state-supervised organization administers a fund, provided through regular periodic contributions, for the mutual provision of medical services for the beneficiaries included under the system.

What Constitutes an Adequate Medical Service

In the first chapter, the Commission offers an outline of what, in its opinion, would constitute an adequate medical service for Alberta.

The quality of the service to be maintained is stressed and the opinion expressed that: "The quality will remain high as long as the study of the medical sciences continues to attract the right type of individual. If we wish to attract or retain well trained practitioners in this Province, then whatever system we employ should provide for suitable conditions under which they may work. These conditions, economic and otherwise, should be at least as attractive here as elsewhere."

The following population-ratio is suggested as an ideal for each type of service:

- One physician to each 1,000 of population.
- One dentist to each 2,000 of population.
- One nurse to each 500 of population.
- One hospital bed to each 250 of population.

Preventive Medicine

Throughout the report the prevention of disease is stressed. The Commission is impressed with the fact that "Even if the mounting costs of public sickness continue at their present rate, it is probable that the day will come when there will not be enough people physically and mentally well to bear the economic burden of taking care of the physically and mentally sick."

The report indicates that prevention is the basic factor in any efficient health service and states that:

"When the individual, the Municipality and the State are prepared to practise in fact what the thinking among them admit in principle, namely, that the most effective way to deal with disease is to prevent it, then we shall have started on the road towards adequate medical service for the people of Alberta."

Existing Medical Services

In the second chapter, medical services, as they now exist in the province, are reviewed.

In the larger cities and in the Full Time Rural Health Districts an adequate preventive service is provided. Elsewhere the preventive service is far from adequate.

The following population-ratio for each type of medical service maintains in Alberta:

One physician to each 1,305 of population.

One dentist to each 3,274 of population.

One nurse to each 740 of population.

In making a survey of hospital facilities in the province it was discovered that we have 413 hospital beds in excess of our population requirements based on the optimum ratio (one bed to each 250 of population). In other words, our approved hospitals are sufficient to serve an additional one hundred thousand people.

With the exception of hospital services, our medical and allied services are inadequate. Yet it is a well known fact that existing services are not being utilized. Some hospitals have only about one-half of their beds in use. Physicians, dentists and nurses, as groups, could do more work than they are getting.

It is also a well known fact that the services that are being utilized are being paid for only in part. From 35 to 40 per cent of all hospital accounts are not collectable and from 50 to 75 per cent of all medical accounts are not being collected.

It is evident, therefore, that existing medical services are not within the individual resources of the people of this province. The question then arises, Can a system be devised whereby medical services will be within the collective resources of the province?

Aside from the usual illnesses of a relatively minor nature, every individual probably will be confronted at least once or twice in a lifetime with a more serious illness requiring either prolonged hospitalization or extensive medical or surgical treatment or both. It is the cost of these major illnesses that cause such a strain on the individual's financial resources. Had this cost been provided for in a yearly budget over a period of years, the financial strain in any one year would not be a serious one.

It is the opinion of the Commission that adequate medical services will never be available to all the people of Alberta until income-earners, through

a system of compulsory contribution, contribute a monthly sum sufficient to provide adequate medical services for all the people of Alberta.

The Plan Outlined in the Report

In Chapter IV the Commission outlines a plan for the provision of adequate medical services for all the people of Alberta. This plan provides as follows:

Benefits in Kind

- (1) The regular general practitioner service of general medicine, minor surgery, obstetrics, etc.
- (2) Specialized service, special diagnostic services and major surgery.
- (3) Hospitalization and hospital facilities such as pathological laboratory services, X-ray services, etc.
- (4) Dental services.
- (5) Prescribed medicines, prescribed surgical appliances, etc.
- (6) A preventive medical service for each unit. This service would be a full-time service similar to that now available in Edmonton, Calgary and the Rural Health districts operating in the Red Deer and High River areas.

The Cost

In Chapter V the costs of the scheme are discussed.

As a basis for the financial structure the per cent distribution of the population according to age and sex was obtained. Morbidity tables segregated as to age groups were prepared. The total of the expected morbidity days was obtained on this basis and the morbidity day cost for each type of service was estimated. Costs of a complete service for all the people of Alberta are outlined in Plan A of the report:

PLAN A

Includes all the people of Alberta. 731,605 at an average morbidity rate of 7.35 per capita = 5,377,296 days.

	Total Cost	Per Capita
5,377,296 days at 66.83c. for hospitals.....	\$3,593,647	\$ 4.91
5,377,296 days at 59.01c. for doctors.....	3,173,142	4.34
5,377,296 days at 13.57c. for drugs.....	729,699	0.99
5,377,296 days at 27.88c. for dentists.....	1,499,190	2.05
Preventive care.....	475,800	0.65
	<hr/>	<hr/>
	89,471,478	\$12.94
10 per cent for administration.....	8947,147	
2 per cent for Contingency Reserve.....	189,429	
	<hr/>	<hr/>
Total.....	1,136,576	1.56
	<hr/>	<hr/>
Per Capita Cost = \$14.50 per year, or \$1.21 per month.	\$10,608,054	\$14.50

Those Included

Since the resolution calls for service to all the people of Alberta, the scheme should include every individual who has established residence in a district operating under the scheme. Obviously the income-earners must provide for those not earning an income.

Those Contributing

Every income-earner in a district included in the scheme shall contribute, every employer shall contribute, and the province shall contribute, on the following basis:

Employees:

Employee	Employer	State
5/9	2/9	2/9

Income-earners (not employees):

Individual	State
7/9	2/9

Collections

Responsibility for collecting the contributions required shall rest with the municipalities included in any unit that has elected to participate in the scheme.

Contributions shall be deducted from the wage-earners included under this scheme and collected from the employers with the employers' contributions. Contributions of income-earners, other than wage-earners, should be a direct charge against the source of the income.

Administrative Units

Each administrative unit should have a population sufficient to employ a full-time preventive health service; that is, a population of not less than 15,000.

The cities of Edmonton and Calgary are large enough to constitute urban units. The rest of the province should be divided into "Combined Units" consisting of urban and rural municipalities and large enough to support a complete medical and hospital service.

Each unit should be included in the scheme on a majority vote of the ratepayers concerned.

Administration

It is recommended that all funds be centrally controlled and administered by a state board.

Both urban and combined units should elect boards that could meet periodically to deal with matters of purely local interest and that could act in an advisory capacity to a provincial board.

A central board, on which the various contributing groups would have representation, should be established to decide matters of important policy.

A central administrative staff similar to that maintained by the Workmen's Compensation Board would be required.

Payment for Services

Payment for medical services under this plan would be on a "services rendered" basis. The practitioners or institutions operating under the scheme would present their accounts to the above-mentioned central administrative staff for payment.

The Central Administrative staff would receive and disburse all funds collected, and would be subject to the control of the Central Provincial Board above mentioned.

This plan gives an estimate of the per capita cost of a rather complete type of medical service. Nursing costs have not been included, as they are in a large measure provided for in the hospital costs. Since the hospital costs have been estimated on a basis of operation, capital and reserve charges, the Provincial Government would be relieved of the present hospital grant charge (about \$400,000 per annum).

On the basis referred to in this report an employee would be responsible for 5/9 of \$1.21 (67c.) per month for each of his dependents and himself. An individual not an employee would be responsible for 7/9 of \$1.21 (94c.) per month for each of his dependents and himself. According to the Dominion's statistician's formula, the average number dependent on one wage-earner's income is 2.4. This number is not to be confused with the average number of persons to a family, which is 4.03. This latter figure cannot be used in these computations, as not infrequently there are more wage-earners than one in a family and a proportion of wage-earners are unmarried and have no dependents.

Under present economic conditions there are from four to five dependent on each worker's income. A fair estimated ratio over a period of years might be one income to each unit of three. On this basis an employee would be required to pay 3×67c. per month, \$2.01; and an individual not an employee would be required to pay 3×94c. per month, \$2.82.

To summarize, an employee, regardless of the number of his dependents, will be required to contribute \$2.01 per month to the scheme.

An individual not an employee, regardless of the number of his dependents, will be required to pay \$2.82 per month to the scheme.

As above noted, the Final Report was tabled in the Alberta Legislature in February of this year. At the time this extract was submitted for publication the Report had not been discussed in the Legislature.

CORRECTION

THE attention of the Editorial Board has been drawn to an error which appeared in the statement regarding the next annual meeting which was published on page 143 of the March issue. It was said that the Dominion charter of the Association was received at the first annual meeting, which was held in Montreal in 1911.

The Editorial Board has pleasure in correcting this statement. The Dominion charter was issued in April, 1912, and was received by the Association at its second annual meeting, held in Toronto in September, 1912.

Lighting and Atmospheric Conditions in an Ontario Public School

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FEW articles on the ventilation and the illumination of the modern public schools in Canada are to be found in the literature and none of the articles include the most recent revisions of the codes for ventilation and lighting (1, 7). Guided by these revisions we have made a survey of the lighting and ventilation in one of the best public schools in Ontario, which is a two-storey twenty-one room building equipped with a hot water heating system and auxiliary heating units.

LIGHTING

In "Standards of School Lighting" (1) an intensity of illumination for classrooms of at least 8 foot-candles and an avoidance of glare is recommended as providing lighting conditions which promote the good health and the education of the children. To determine whether or not these standards were attained by the Ontario school, readings have been made of the intensity of the illumination and of the glare conditions in the various rooms.

Method

The intensity of the illumination has been determined for each desk and for each section of the blackboard in twenty-one rooms, the readings being made with the recently designed Weston Illuminometer. This instrument consists essentially of a photronic cell and a milliammeter, which is calibrated in foot-candles since approximately 1 milliampere of current is generated by the cell for each foot-candle of incident light. Thus the intensity of the light which reaches the cell is registered in foot-candles by the milliammeter.

The amount of glare on the blackboard has been determined in sixteen classrooms. This was accomplished by estimating at each desk the area of the portion of the blackboard on which writing was invisible.

Results

The intensity of the illumination in rooms other than classrooms is shown in the following table.

TABLE I

THE INTENSITY OF THE ILLUMINATION IN ROOMS NOT USED CONTINUOUSLY

Room	Foot-candles at work level	
	Maximum	Minimum
Domestic Science	81	20
Sewing	34	5
Manual Training	48	9
Auditorium	21	6
Gymnasium	40	8
Library	83	20

The average foot-candle reading for the intensity of the daylight illumination for each row of desks in the sixteen classrooms is shown in Figure I. The row next to the windows is highest, with an average for all the rooms of 144 foot-candles and a maximum of 350 foot-candles, whilst the row farthest from the windows is the lowest, with an average for all the rooms of 20 foot-candles and a minimum of 5 foot-candles. The artificial lighting is supplied by units of the enclosed semi-indirect type, the outlets for which are marked as circles in Figure I. The areas in each room in which the pupils suffer from daylight glare are represented by the shaded portions in Figure I. The degree of glare is approximately as the intensity of the shading.

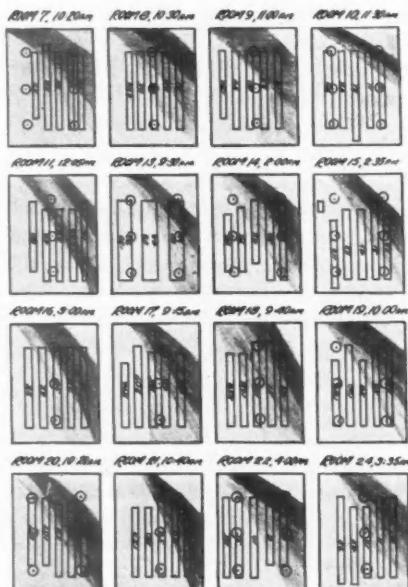


FIGURE I

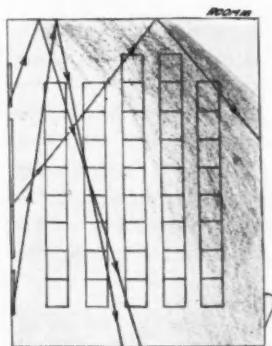


FIGURE II

Figure II, in which the plan of room 18 is drawn to scale, shows why the occupants of the seats in the shaded area are subjected to daylight glare from the blackboard.

The results obtained in the study of the daylight glare are given in Table II. The approximate number of students subjected to glare was judged by the number of seats in the glare area.

TABLE II
DISTRIBUTION OF ROOMS ACCORDING TO THE PERCENTAGE OF THE PUPILS
IN THEM AFFECTION BY GLARE

Approximate percentage of pupils subjected to glare	16	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
Number of rooms . . .	1	2	4	2	4	1	0	0	2

Expressed according to the percentage of pupils subjected to glare in any classroom the maximum was 71, the minimum 16, and the average 48.

Discussion

For the purpose of maintaining an intensity of illumination exceeding 8 foot-candles throughout the year, classrooms should be equipped with windows having a net glass area of not less than 1/6 the floor area (4) and in addition should be provided with at least 6 electric outlets (1). The requirements with regard to the window area are fulfilled by this school, and during the month of March the intensity of the natural lighting exceeds 8 foot-candles in all but two of the classrooms. In these two rooms the illumination can be raised to the desired level since the artificial lighting is adequate. During the winter months when the daylighting is supplemented by artificial illumination, the intensity in 8 of the rooms would doubtless be inadequate since these rooms are equipped with only 3 outlets.

Where fine detail work is to be done, as in sewing, drafting, or art rooms, the maximal amount of daylight illumination should be obtained by arranging the class period for the brightest part of the day and by placing the work benches near the windows. The latter precaution has been neglected in the sewing room of this school since the intensity of the illumination is only 5 foot-candles on a bench in a dark corner of the room. The other rooms which are not used continuously, however, are adequately lighted.

The measurement of the amount and the intensity of daylight glare is a difficult problem, since no instruments have been designed for the purpose. The method which we have used to determine the severity of the glare is a subjective one and therefore is somewhat unsatisfactory, but it has the advantage of giving the approximate number of seats from which a portion of the blackboard is rendered useless through the presence of daylight glare and thus indirectly giving the number of pupils affected by glare and also giving a measure of the extent of the glare in the various rooms. The study which we have made in this school shows that although 320 of the 660 pupils are subjected to glare conditions, the number affected by glare is not the same in all the rooms. Where the windows are large and are not shaded by adequate blinds or projections of the building, the glare is widespread. With a flexible system of Venetian or translucent blinds (1,2) the intensity of the daylight may be reduced so that the glare is diminished while the illumination is maintained at an intensity exceeding 8 foot-candles. Such a system of blinds is especially effective for eliminating glare when the artificial illumination is adequate and the blackboard is lighted by properly screened and judiciously placed local units (1,2,3).

Since the results of the survey show that glare may interfere with the vision of many pupils in a school, it is suggested that the attention of all those who are interested in the health and education of children should be focussed on the problem of the detection and the elimination of glare.

VENTILATION

Although it is well established that the dry bulb temperature, the relative

humidity and the movement of the air together determine the comfort of a subject the values for the three factors that give a maximal amount of comfort have been standardized only recently (5, 7, 8). These standards have been applied to the readings of the temperature, relative humidity, and air movement to determine the comfort of the pupils in this school.

Method

In the study of the ventilation the sling psychrometer and the Kata thermometer have been used. The readings have been made at five places in each room at desk level which was approximately two feet from the floor.

Results

Table III gives the number of rooms with the various conditions of ventilation.

TABLE III

THE NUMBER OF ROOMS WITH THE VARIOUS CONDITIONS OF VENTILATION

Degrees F° No. of rooms	60.5-67.9 1	68-68.9 3	69-69.9 5	70-70.9 3	71-71.9 3	72-72.9 1	73-73.9 4	74-74.9 1
TEMPERATURE								
Percentage Number of Rooms	20-24 2	25-29 14	30-34 4			35-39 1		40-49 0
RELATIVE HUMIDITY								
Kata Reading Number of Rooms	4.0-4.4 0	4.5-4.9 5	5.0-5.4 8	5.5-5.9 4	6.0-6.4 3	6.5-7 0	7.5 1	
COOLING POWER								
Degrees Number of Rooms	57.8 1	62.0-62.9 2	63.0-63.9 4	64.0-64.9 7	65.0-65.9 1	66.0-66.9 4	68	
EFFECTIVE TEMPERATURE								
Feet per minute Number of Rooms	10-19 1	20-29 14			30-39 4		40-45 2	
AIR MOVEMENT								

In Table IV the results listed in Table III are summarized.

TABLE IV

SUMMARY OF THE VARIOUS CONDITIONS OF VENTILATION

	Low	High	Average	Mode
Dry Bulb Temperature in degrees F.....	60.5	74.5	70.3	69.9
Wet Bulb Temperature in degrees F.....	47.5	56.0	52.9	53.0
Relative Humidity in per cent.....	20.0	40.0	28.0	26.0
Cooling Power, Kata reading	4.5	7.5	5.4	5.4
Effective Temperature in degrees	57.8	68.0	64.5	64.5
Air Movement in feet per minute.....	10.0	45.0	28.0	28.0

The air introduced into the rooms by a unit ventilating system has a temperature exceeding 120 degrees F. and has a relative humidity of less than 10 per cent.

The approximate pathway of the maximal air movement in each room as determined from the Kata thermometer readings is shown in Figure III. The figure also shows the position of the unit ventilator and the main exhaust in each room.

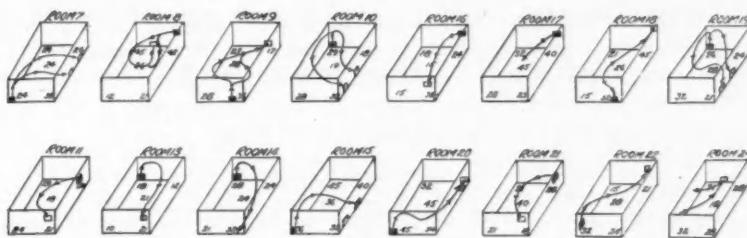


FIGURE III

The solid black block indicates ventilating unit and the clear squares represent the exhaust ducts.

Discussion

At the present time the two standards for ventilation by which the comfort of school children may be determined are unsatisfactory. The standard of the New York State Commission (6), which advocates a temperature of 68 degrees F. and a moderate humidity, has two defects. First, the value for the relative humidity is not defined exactly and this value has a very direct influence on the dry bulb temperature necessary for comfort. Second, the recommendations are based upon experiments which were conducted in the schoolroom where no attempt was made to maintain a constant temperature and relative humidity. Although these criticisms do not apply to the standard adopted by the American Heating and Ventilating Engineers (7), nevertheless their criterion should not be applied at the present time in the study of the ventilation in schoolrooms. Their researches were conducted with subjects whose age range was between 20 and 70 years, and the results may not represent conditions for the comfort of children of school age. However, preliminary experiments with children between 8 and 12 years of age have been in progress in the School of Hygiene in the University of Toronto and indicate that, in summer at least, this code can be applied to determine the comfort of young children. The code of the American Heating and Ventilating Engineers (5) does not agree with that of the New York State Commission (6). This is shown by the fact that the temperature of 68 degrees F. (6) is too low for comfort since with this temperature the maximal comfort is attained only when the relative humidity is 72 per cent, a value which is not practical during the winter months (5). The range for the relative humidity which is favored by most investigators is between 40 and 60 per cent since with these values a moderate dry bulb temperature gives conditions that are comfortable to the majority of subjects (5). A dry bulb temperature of 71 degrees and a relative humidity of 40 per cent gives conditions that are both practical and comfortable. It should be remembered, however, that there is no experimental proof that any one value for the relative humidity is ideal for health.

According to the criterion of the New York State Commission, 17 of the 21 rooms in the school which we have surveyed are overheated while only one is too cold. When the standard of the American Heating and Ventilating Society is applied to the same findings, no room is overheated while three of the rooms are uncomfortably cool for the pupils.

The relative humidity in 17 of the rooms falls below 30 per cent, a value lower than is considered to represent good conditions of ventilation (7).

A freedom from draughts is obtained when the air movement at the desk level does not exceed 50 feet per minute (7) and consequently in this respect the ventilation of the school is satisfactory.

CONCLUSIONS

The results of the survey indicate that the lighting and the ventilation of this public school are unsatisfactory in certain respects. The studies of the illumination show that although the intensity of the daylight illumination is satisfactory the artificial lighting is inadequate in fifty per cent of the rooms and the glare conditions are so severe that almost fifty per cent of the pupils are unable to discern writing on a portion of the front blackboard. The findings of the survey of the ventilation are difficult to assess since the present standards for the comfort of school children are unsatisfactory. With the ventilating system which is installed, however, the conditions of either of the existing codes could be fulfilled. Since the air movement is adequate, a dry bulb temperature on the thermostatic control of 68 degrees F. would satisfy one code, while a dry bulb temperature of 72 degrees F. with a relative humidity of 30 per cent would be comfortable to the majority of pupils according to the other code. A compromise between the dry bulb temperatures advocated by the two codes could be made if a humidifying device were installed in the auxiliary heating unit to maintain a relative humidity of 45 per cent in conjunction with a dry bulb temperature of 70 degrees. The ventilation and illumination conditions are probably better than those obtained in most schools since there is an active interest shown by the School Board, Home and School Club, principal and staff, and every effort is being made to improve the existing conditions.

SUMMARY

The atmospheric and lighting conditions in one of the best public schools in Ontario have been studied. The findings have been discussed in relation to the existing codes for the ventilation and the lighting of school buildings.

The authors wish to express their thanks to Professor C. H. Best for his kind interest in this work. They also wish to thank Dr. J. G. FitzGerald, Director of the School of Hygiene and Dean of the Faculty of Medicine, and Dr. J. T. Phair, Director of the Division of Child Hygiene, Provincial Department of Health, for their helpful interest, and J. Brown for his valuable technical assistance.

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Problems in Infant Hygiene and What Statistics Reveal*

AGNES B. BAIRD, REG.N.

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FOR some years now there has been an increasing national interest in the loss resulting from deaths in infancy. The toll in Canada in 1931 was 20,360, an average of fifty-six a day.

In keeping with this interest there has been a development of literature, propaganda and publicity centering on the value of the life of the child and giving rise to a concentrated attack on infant mortality and its causes. Pure milk and water, proper feeding, adequate housing and fresh air campaigns have been carried on. Not only have improved methods of care been instituted in hospitals, but great stress has been laid on teaching the mother in the home how to care for her child.

Maternal and Neo-natal Deaths

Inseparable from the child's life has been the need of preserving the mother's health, providing adequate care during pregnancy and labour. With the concentrating of effort and interest on the question of infant mortality, that of maternal mortality has not received its due. The importance of the mother to the state is recognized in the fact that federal legislation justifies the physician in sacrificing the child for the sake of the mother. Her importance in the home cannot be overestimated. In a special study made in 1927-28 by Dr. Helen MacMurchy, formerly of the Department of Pensions and National Health, Ottawa, it was ascertained that 1,532 mothers who so died in one year left 5,073 children, of whom 768 were their new-born babies, thus creating a serious problem for community and state. As the alarming rate of maternal mortality has been brought to the fore, the whole field of obstetrics has received a more prominent place in the popular conception of health.

Considering Canada exclusive of the province of Quebec, which did not enter the Registration Area until 1926, the maternal mortality rate shows an upward trend from 1921 to 1924. This movement probably was due in part to better certification resulting from the practice, consistently followed by the Bureau of Statistics, of querying doubtful certificates. Between 1926 and 1930 the rate showed very slight fluctuation. The first significant reduction occurred in 1931, when the rate fell to 5.2 per thousand live births, as compared with 5.9 per thousand in 1930.

One-half of all infant deaths in 1921, increasing to 55 per cent in 1931, are attributable to causes associated with childbirth, such as congenital mal-

*Presented before the Vital Statistics Section at the Twenty-Second Annual Meeting of the Canadian Public Health Association, Saint John, N.B., June, 1933.

formation, premature birth, injury at birth, congenital debility and residual causes.

Deaths in the first month of life are frequently termed neo-natal deaths. The mortality in this first month is very much greater than that of any other month in the first year. This neo-natal period may be regarded as transitional between intra-uterine and infant life. One of the greatest factors in neo-natal mortality is prematurity. During the years 1926 to 1931 in the eight provinces of the Registration Area as of 1921, 53 per cent of the total infant mortality occurred in the first month, 38 per cent in the first week and 20 per cent in the first twenty-four hours.

Examining this neo-natal death rate by causes, it is among the malformations and diseases of early infancy that we naturally look for a reduction. Here again, as in the total infant mortality, we fail to find any downward trend in the deaths assigned to malformations or to premature birth and injury at birth. There is, however, a well marked reduction in the death rate from congenital debility, icterus and sclerema, while the residual term "other diseases peculiar to early infancy" also shows a definite downward movement. In both cases this reduction may be partly the result of greater definiteness in certifying the later years, particularly as "diseases peculiar to early infancy" contain unspecified and ill-defined deaths to three months of age. To the extent that this is true, the more definite causes of neo-natal deaths, such as premature birth and injury at birth, may be done some injustice in the recorded trend. The reduction in the death rate from convulsions, a symptom rather than a disease, which fell from 160 per 100,000 in 1921 to 59 in 1931, is to be ascribed mainly to better certification. Analysis of the statistical records for 1928 shows that 1,295, or 14 per cent of infants dying in the first few months of life were not attended by physicians at the time of death.

Stillbirths

Stillbirths registered both as births and deaths constitute 27 per cent of the total infant deaths, including stillbirths. As distinguished from a stillbirth, a live birth is one having pulmonary respiration after complete birth. From 1921 to 1931 the minimum period of gestation compatible with viability was six months, but as from 1932 it has been increased to 6½ months or 28 weeks on the recommendation of the Vital Statistics Section of the Canadian Public Health Association. The rate has shown a reduction from 3.6 in 1921 to 3.2 in 1931. Definite causes for neo-natal deaths and stillbirths are difficult to name. The causes of stillbirths are frequently omitted on the medical certificate, the physician evidently considering the one word *stillbirth* sufficient entry under "cause of death."

In the summary and conclusions of a report on 240 autopsies of stillborn and neo-natal deaths by Dr. Fred Adair, it is stated:

"(1) We must reduce the number of premature births by better care of women, especially during pregnancy, and by

"(2) A proper understanding and preventing of the causes of the premature onset of labor.

"(3) Antenatal stillbirths make up nearly 1/5 of this series of autopsies. The main determined contributing causes were toxæmia of pregnancy and syphilis.

"(4) Intra partum stillbirths make up about 1/6 of the total number examined. Over half the prematures and three-quarters of the term infants suffered severe birth injury as a result of spontaneous labor or of various procedures instituted.

"(5) Post-natal stillbirths are those in which the heart beats without establishment of respiration. This group includes a considerable number of major malformations. About one-half of these deaths are caused by birth trauma. The main measures of protection are: (a) detection and management of toxæmias of pregnancy; (b) prevention, diagnosis and control of syphilis; (c) reduction and prevention of birth injuries by better obstetric practice; (d) prevention of premature births and better care of premature infants; and (4) better care of newborn infants to prevent exposure, improper feeding, shock and infection."

In short, it is a repetition of the cry, Better prenatal, natal and postnatal care of mother and infant.

Communicable Diseases

Whooping cough annually accounted for more deaths during the first year of life than measles, scarlet fever and diphtheria combined. During the ten-year period, in the eight provinces constituting the Registration Area of 1921, diphtheria mortality has fallen 59 per cent and the scarlet fever rate 82 per cent. The fluctuations in the incidence of whooping-cough and measles are too pronounced to determine any definite trend. One fact with regard to measles is evident: 42 per cent of the infant deaths from this causes occurred in the three years of highest influenza mortality.

The years 1923, 1926 and 1929 may be described as influenza years. In these, as is to be expected, there was an increase in the general infant death rate, as well as in that for influenza and pneumonia. About 40 per cent of infant deaths from influenza which occurred in the eleven years from 1921 to 1931 were in these three years. Pneumonia follows closely on the fluctuations of influenza and shows no marked downward trend in this time.

The dread diseases of early infancy, enteritis and diarrhoea, so often the result of improper feeding, neglect and lack of proper sanitary measures, show a decline slightly more rapid than that of the general infant death rate. Diarrhoea and enteritis caused one death in six in 1921, and one in seven in 1931.

Infant Mortality in Quebec

As the province of Quebec did not enter the Registration Area until 1926, figures on the same basis as those for the other provinces are available only for the six years 1926 to 1931. It was thought wiser to postpone examination of figures for this province until those for a ten-year period are available as compiled under the national system.

It is of interest to note, however, that during the period of six years, in answer to the carrying out of health measures, the infant mortality has decreased from 142 to 113 per thousand live births. Twenty-eight per cent of infant deaths during this time were due to diarrhoea and enteritis, as compared with 12 per cent in the other provinces for a similar period. Forty-three per cent of infant deaths during this period were due to prenatal conditions and those at the time of birth, such as malformations, congenital debility, premature birth, injury at birth and other diseases of early infancy, in contrast to 54 per cent for the rest of Canada.

SUMMARY

For the eight provinces in the Registration Area, the ten-year period ending in 1931 showed the result of the vigorous measures taken to protect infant life.

A decline in the infant death rate from 88 to 70 per thousand live births is a matter for congratulation. The greatest decrease in an individual province is that in New Brunswick, from 1133 in 1921 to 87 in 1931.

The further need for effort in providing skilled care during the whole of the maternal cycle and teaching the need for that care is of the greatest importance. Continuation of measures of general hygiene and sanitation with unceasing vigilance in the control of communicable diseases should result in still further decreases in the years to come.

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES

NOVEMBER, 1933

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	1	7	14	148	63	71	9	3	—
Scarlet Fever.....	6	42	47	443	558	145	28	25	298
Measles.....	—	—	—	403	89	4	67	1	2
Whooping Cough.....	—	41	16	582	353	221	53	25	83
German Measles.....	—	—	—	9	15	—	8	2	24
Mumps.....	—	—	—	685	255	24	134	1	169
Smallpox.....	—	—	—	1	1	—	—	—	—
Cerebrospinal Meningitis.....	—	—	—	3	3	1	1	1	2
Anterior Poliomyelitis.....	—	—	—	14	4	—	3	5	—
Typhoid Fever.....	—	4	7	152	55	8	10	2	9
Trachoma.....	—	—	—	1	1	2	19	—	21

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

The Vitamin D Content of Eggs

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IT is probable that no article of diet is more commonly eaten in all countries or served in a greater variety of ways than the egg. This is especially true of Canada, for the per capita consumption of eggs is probably higher here than in any other country in the world.

The reasons for this extensive use are evident. Eggs contain several types of proteins and have a blending of the essential amino acids in about the proportions required by man, so that eggs are classed as superior protein food for human consumption. Egg white is practically devoid of fat and contains only traces of minerals, being almost pure albumen. Egg yolk contains protein, fat, and allied substances, a variety of minerals and vitamins. It is rich in phosphorus and contains appreciable amounts of iron and copper. These are three minerals which are often deficient in many human diets.

It is interesting to note that egg yolk was one of the first natural foodstuffs to be recognized as containing protective powers against deficiency diseases (Stepp, 1909, 1912). The egg is now known to contain all the vitamins in generous amounts, with the exception of vitamin C. Most of the vitamins are contained in the yolk, although the white is a good source of vitamin B₂(G). However, within wide limits, the concentration of any vitamin in the egg depends upon the amount of that vitamin supplied in the diet of the hen which laid the egg. The trend of modern dietetics seems to be toward increasing the vitamin content of the human dietary by the judicious choice of natural foodstuffs containing appreciable amounts of these vitamins. The egg is particularly useful in this endeavour, for not only does it comprise such a food, but it is one whose vitamin content can be regulated. In fact, its vitamin content can be increased many times the normal by the feeding of liberal amounts of the various vitamins to the hen.

Vitamin D, the antirachitic factor, is not nearly so generally found in foodstuffs as are the other vitamins. It is most likely to be deficient in usual dietaries. This is especially true in this country since exposure to beneficial ultra-violet light in sunshine is not sufficient, during the winter months, to prevent the onset of rickets. It is generally accepted that some source of vitamin D should be added to the diet, particularly of infants, during these months.

Fish oils are the most potent natural sources of this vitamin and egg yolk is next in value. For this reason eggs have a particular value in the diet of the infant and the expectant or nursing mother. The blood of most infants suffering from rickets has a subnormal concentration of phosphorus. As egg yolk contains relatively large amounts of phosphorus, its inclusion in the diet of rachitic children would be of added value in restoring the plasma phosphate to normal.

The presence of valuable amounts of vitamin D in egg yolk was first demonstrated by Mellanby (1921). Hess (1923) confirmed this finding and reported that boiling the egg for twenty minutes did not apparently lower its vitamin D content. In addition, he

carried out prophylactic treatment of twelve infants to forestall the development of rickets during the winter months. The addition of one egg yolk per day to the diet not only prevented rickets but the usual seasonal ebb in the level of inorganic blood phosphorus did not occur during these months. Casparis, Shipley and Kramer (1924) were able to cure rickets, in seven cases, upon including one or two eggs in the daily diet. Collier (1924) prevented the development of leg weakness in chicks, a condition essentially similar to rickets in mammals, by feeding them "hard boiled" eggs. Tso (1926) found egg yolk valuable in enabling the body to utilize a limited supply of calcium.

Several investigators have definitely determined that the antirachitic potency of egg yolk is influenced by the ration fed to the hen, or by the exposure of the hen to sunshine or ultra-violet irradiation. Hughes, Titus and Moore (1925) experimented with four groups of hens receiving, respectively, direct sunlight and direct irradiation with a mercury vapour quartz lamp, sunlight through ordinary window glass, and direct irradiation, direct sunlight alone, and direct irradiation alone. The eggs from these various groups were fed to chicks fed on a rickets-producing diet. The eggs from the hens without ultra-violet light (sunlight through glass) did not prevent rickets, eggs from those hens with considerable ultra-violet (sunlight and irradiation) completely prevented its development and eggs from hens with less ultra-violet (no irradiation) allowed the development of some rickets. Hart, Steenbock, Kletzein, Halpin and Johnson (1925) found that the vitamin D content of the yolk of eggs laid by hens receiving ultra-violet irradiation was about ten times that of eggs from non-irradiated hens. Bethke, Kennard and Sassaman (1927) were able to increase the vitamin D potency of eggs some five times by including cod liver oil in the hens' ration, and some ten-fold by giving the hens access to a blue grass range.

Steudel (1929) showed that a protein-free, fatty fraction of egg yolk was powerfully antirachitic. Kome (1931) found that a commercial extract of egg yolk was antirachitic and Lesne and Clement (1931) found appreciable quantities of vitamin D in both a commercially dried egg powder and in the yolk of eggs preserved for eight months in silicate solution. The antirachitic potency of egg can also be increased from fifteen- to twenty-fold by direct irradiation of the yolk (Steenbock and Black, 1925).

It seemed feasible and of some therapeutic interest to investigate both the seasonal variation in the antirachitic potency of the egg yolk and to determine the relative potencies of eggs from groups of hens receiving varying amounts of vitamin D in their diet over a period of some months. Accordingly a research problem was undertaken in this Department in co-operation with the Research Laboratories of the Hospital for Sick Children, Toronto. The various groups of hens received a diet with such ingredients as would be fed to the majority of commercial poultry flocks, with the exception of the amounts of vitamin D. The sources of vitamin D studied were cod liver oil, viosterol (irradiated ergosterol), ultra-violet irradiation from a mercury vapour lamp, and direct sunshine. Two dozen eggs from each group were collected once a month and the amount of vitamin D in the yolks was biologically determined.

The results confirmed the previous findings that egg yolks are rich sources of vitamin D and that the antirachitic potency of the egg is increased by the addition of Vitamin D to the ration fed to the laying hens. The average egg yolk from hens receiving this diet with no vitamin D added contained about 4 Steenbock units of vitamin D, but if two per cent of cod liver oil was added to this diet the yolk contained 30 units, or about an eight-fold increase. It is generally accepted that for the prevention and cure of rickets in infancy three teaspoonsful of cod liver oil is the daily requirement. This would be approximately 140 Steenbock units. For children over two years of age about 50 of these units are required for normal nutrition. Hence it will be seen that an egg per day, from hens receiving this amount of cod liver oil, would go far towards meeting the vitamin D requirements of children. It is fortunate also that efforts to raise the vitamin D content of eggs are beneficial to the hen. The addition in

proper amounts of some source of vitamin D to the ration of laying hens not only markedly increases the number of eggs laid but also the number of chicks which will hatch from the fertile eggs incubated. Two per cent of cod liver oil in the hen's mash is the usually recommended level.

However, the vitamin content of eggs was further increased by the use of viosterol in the diet of the hen. When two per cent of a 1 D preparation of viosterol, that is, having the same vitamin D content as cod liver oil, was fed to the hens, the egg yolks were found to contain 30 Steenbock units, the same as contained in the eggs of hens fed two per cent of cod liver oil. However, when larger amounts of viosterol are fed they are inefficiently transferred to the egg. For example, one group of hens received two per cent of 10 D cod liver oil, which is cod liver oil fortified by viosterol so that it is ten times as potent as ordinary cod liver oil, but the eggs from these hens contained only 60 units of vitamin D. In other words, although the hens received ten times as much vitamin D, the egg yolk potency was only doubled. The group of hens receiving two per cent of 250 D viosterol laid eggs containing some 800 to 1,300 units of vitamin D, or about a thirty-five-fold increase. Those hens receiving two per cent of 10,000 D viosterol laid eggs containing from 18,000 to 25,700 units per average yolk, a six-hundred-fold increase or more.

This last group were especially interesting since they received an enormous dose of vitamin D. It has been well established in some species that too much vitamin D is decidedly toxic, resulting in calcification of various organs, particularly the heart and kidneys. The daily amount of vitamin D received by the hens fed 10,000 D viosterol was sufficient to kill a good-sized dog in three to five days, but these birds withstood such a dose for six months with little or no indication of ill effect in so far as they, themselves, were concerned. However, for the last three months not a single chick could be hatched from the eggs laid by these hens, and even the feeding of smaller amounts of viosterol resulted in some deleterious effects on the developing embryo.

Many investigators have found that viosterol (irradiated ergosterol) is relatively inefficient, as compared with cod liver oil, in preventing rickets in chicks. It requires from 40 to 100 times as much of the vitamin D in viosterol as compared with the antirachitic factor in cod liver oil to prevent rickets in chicks. In fact, Wisconsin workers concluded, from results with chicks, that the vitamin D in irradiated ergosterol, or that produced by ultra-violet light, was not the same as the vitamin in cod liver oil. For this reason, the antirachitic potency of the eggs laid by those hens receiving viosterol was tested on chicks. It might be possible that, during the utilization of this vitamin D from the viosterol in her food and its subsequent deposition in the egg yolk, it might be changed so that it would be as efficient as the vitamin D in cod liver oil. Such was not the case; apparently viosterol fed to hens is deposited as viosterol in the egg.

The exposure of the hens to ultra-violet irradiation from a mercury vapour arc lamp, for twenty minutes daily, also led to a slight increase in the antirachitic potency of the eggs laid. A group of hens fed on the basal diet, with no vitamin D supplement, were not allowed on range, but had access to what-

ever sunshine was available by means of openings in the pens. From the monthly assays of the vitamin D content of the eggs laid by this group, it would appear that birds raised out on range store up a supply of vitamin D, from the grass and sunshine, which becomes gradually depleted during the winter months. The vitamin D content of these eggs was lowest in February and March and slowly increased from April on, when more sunshine is received during the spring.

As there is some variation in the rations fed to laying hens, especially in the amount of vitamin D supplied, there may be some variation in the anti-rachitic potency of the eggs purchased by the general public. In order to determine such variations one dozen fresh eggs were purchased monthly from twelve different stores and the vitamin D content of the pooled yolks from one egg in each dozen were tested. These eggs contained from 7.5 to 10 units of vitamin D. This is more than was contained in the eggs of hens receiving no cod liver oil but less than in the eggs of hens receiving two per cent of cod liver oil. Undoubtedly some of the flocks were receiving cod liver oil, while other flock owners were either feeding no vitamin D or else an insufficient amount. However, these findings show that generally eggs are valuable sources of vitamin D. Further tests on eggs that had been in cold storage for some months indicated that their vitamin D content had not deteriorated.

A case of fairly severe rickets in a negro child was cured by the daily inclusion in his diet of one egg, from the hens receiving two per cent of viosterol. The value of the egg has been well summed by Blunt and Cowan: "The richness of eggs in vitamin D is one of the many reasons for their dietetic value. Physicians and nutritionists are realizing that the educational campaign for increasing the use of milk could well be supplemented by a similar one for eggs, to the great advantage of babies, children and adults." It would seem feasible to supply eggs for hospital and infant feeding use the vitamin content of which could be fairly definitely assured by supervision of the diet and management of the laying flock.

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Mental Hygiene and Behaviour

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ACCURATE and exhaustive history-taking as a basis for diagnosis and treatment in the case of those suffering from either physical or mental disorder is essential. The value of an adequate social history in seeking a cure for the patient emotionally disturbed is, if possible, more imperative. To get at the source of his behavior and personality disorders, we must delve deeply into the child's earliest experiences.

In the cases presented, I have tried to trace the unsocial conduct trends of each case, from the early home influences and personal experiences which would be likely to have disastrous effects on the developing personality of a child. I have also tried to see the child's point of view in relation to his troubles.

Parents frequently explain that only one of their children is difficult to manage, has temper tantrums or other abnormal behavior traits, which shows, to their own satisfaction, that the blame lies somewhere else and not on their shoulders. At times, we, ourselves, are inclined to be discouraged in our search for the out-of-the-ordinary circumstances which are responsible for his present behaviour.

CASE 1: TEMPER TANTRUMS

Katie was one of twins in a family of eleven children. The parents were continually quarrelling. The father, an indifferent mechanic, drank and was unreasonably jealous of the mother, neglecting his work and remaining at home to watch her. The mother was a fine housekeeper, but could not read or write. The family were poor, sometimes receiving help from the community.

The children were given little care or supervision, going and coming as they pleased, and frequently being away from home late at night. Katie, at the age of eleven years, was known to have had sex relations with several old men. About this time, her teacher complained of her behaviour in school.

Because of neglect on the part of the parents, the twin sisters were made wards of the Director of Child Welfare and were committed to a girls' reformatory institution, where they were given kindly care and good training. Special consideration was shown in the care given Katie, on account of her unfortunate sexual experience. She was happy in the institution and fond of the superintendent and officers; but was, nevertheless, a most difficult child to manage.

While in the institution, she was examined mentally by the Provincial Psychiatrist, and found to be subnormal, with an intelligence quotient of 65. Although mentally deficient, she was described as being quite attractive and alert, and was in Grade 3 in school. The other twin was of the same mentality. After being in the reformatory for almost two years, the sisters were placed in the Provincial Training School for mental defectives. They had grown accustomed to the life and discipline of the Home, and resented the change. It was some months before they could adjust themselves to their new surroundings.

Both girls had a jealous disposition, were thoroughly selfish, and, sometimes, disobedient, obstinate and quarrelsome, with frequent temper tantrums. On the other hand, they were clean and neat in their personal habits, affectionate, leaders in play, self-confident, and showed some initiative and originality. One of the odd traits noticed was that when one of the twins

was being a grave and distressing behaviour problem, the other's social behaviour was all that could be desired. Moreover, the well-behaved twin for the time being, was much ashamed of her disorderly sister. This went on for more than a year, the girls alternating and one being "good" while the other was impudent, disobedient and almost incorrigible.

Finally, at the age of fourteen years, the twin, Cora, seemed to change decidedly for the better. She ceased giving trouble and began to make favourable progress in all the activities of the school. Katie's behaviour was entirely opposite. Tantrums, with obscene language and violence, were common occurrences. Screaming spells would last for hours, and later the girl would proudly recount her actions and boast of the attendant's inability to control her.

On account of her injurious influence on the pupils of the Training School, and because her behaviour was not understood, Katie was sent to the Hospital for the mentally ill for observation, and treatment if necessary. She remained there for six weeks, when she was sent out with the report that she showed no signs of insanity. She had been good-natured, obedient and helpful, with no temper tantrums, during her stay in the Hospital. Next she was placed in a private home, where she stayed for some weeks, showing only the traits of a mentally subnormal girl with poor home training, but one who had a longing to manage her life in her own way. The foster-mother was found not to understand a girl of this type. She thought that Katie's intelligence should be on a par with her outward appearance. She could not understand that a girl could be subnormal when she was not of the imbecile type. This attitude on the part of adults, of setting up a certain standard and expecting children to live up to it, is harmful to the development of a normal child and utterly destructive in the training of a feeble-minded person. This was an attitude that Katie had unconsciously been fighting against practically all her life. Her good looks and attractive manner had unhappily been a drawback to her, even with intelligent people who were at different times looking after her.

While Katie resented the move, it was found necessary to return her to the Reformatory, where she continues to be a serious behaviour problem.

Discussion

Summing up the causes of Katie's behaviour, I think we can blame some of it to her mental defect, but more to environment with the early sex experiences.

We have three situations in the early life of a child, each of which might easily be considered as a sufficient cause for abnormal behaviour:

Firstly, the lack of wise parental guidance, so that the child did not acquire the early habits of obedience and self-control;

Secondly, the friction in the home, caused by jealousy and quarrelling of the parents;

Thirdly, sexual experience.

The unusual sex experience causing both repressions and desires is probably one of the causative factors for the emotional outbursts.

As to the future, the outlook is poor on account of this girl's mental defect, although mental deficiency is not alone a cause of delinquency; yet it does create a situation where it is difficult for the individual to re-adjust herself to life.

CASE 2: TRUANCY AND INCORRIGIBILITY

William C., age 13 years, dull normal, grade 6, was born out of wedlock. He was left in infancy to the care of a grandmother and several uncles. In this somewhat hostile atmosphere the child lived and grew, with many influences at work to hinder the upward trend of his developing personality.

In early childhood he contracted both pneumonia and typhoid fever, with a long drawn-out convalescence. The child was allowed unwise privileges. When he became well, he was punished for what he had been allowed to do when ill; this seeming unjust treatment was naturally resented. It is a little too much to expect a four-year-old to reason that it is all right to the adult mind for a sick child to demand or cry for what he wants, to be stubborn, defiant and disobedient; but it is very bad form for a well child to act in this socially unacceptable manner. We seem to expect children to understand the mysterious and unreasonable behaviour of grown-ups, though grown-ups seldom understand children. Yet if they do not conform to our wishes and ways, we call them naughty, bad, or even incorrigible.

At the present time there are in this home, besides the grandmother and uncles, an uncle's wife with four young children. The house, therefore, is over-crowded; poor but comfortable, so that the child has the bare necessities but none of the luxuries of life. The grandmother, a frail old lady, tells untruths to the family and others to shield the child, and she will not admit that he is a problem. This indulgent attitude is less due to her love for the boy than to her unwillingness to admit that she cannot control him. Moreover, she does not wish to be worried. There is, too, some natural maternal feeling towards him, which inclines her to protect the child from the harshness and the unwise discipline of his uncles.

He has been taught to believe that his grandmother is his mother, though her sons are his uncles. The facts relating to his birth have never been explained to him by his grandmother, and the pretense is maintained that he does not and will not know. However, he has talked to his scout leader about his birth, giving the impression that he looks upon himself as more or less of an outcast, and that no one cares for him. At home he is sulky and disobedient, and stays out late at night. He has been punished many times for his misdemeanors by his uncles, who now say they are through trying to help him, as they consider his case hopeless. If this is true, it will be of great advantage to him, since their method of correction was worse than useless. His conduct in his neighbourhood has not been very serious. At one time he took a bicycle that belonged to another boy and went for a ride. He may have planned to return it, as he insists, but was caught by the police officer before he had done so. He maintains that he only borrowed the wheel, and did not intend stealing it.

He has been a truant from school on several occasions.

For some time, his behaviour has been the cause of much concern to his teacher and to the principal of his school. He laughs frequently, with no apparent cause; often makes a disturbance, interferes with the other pupils, and is inattentive during lessons. Recently, the principal said he considered the boy "insane", but, from a fairly long study of his conduct, I do not feel that this is a safe or satisfactory conclusion to draw.

Willie does not seem to realize that he is to blame in any particular case, and he would not admit that his conduct disturbed the school more than that of others. Neither would he agree that he had been unmanageable at home. He continually complained of the unfairness of his teacher, giving many instances of privileges allowed other boys that were denied to him: that was as it seemed to him. On the other hand, the teacher appeared to be a young woman of splendid ability, who understood and sympathized with the boy's difficulties, which were due mainly to his slight mental retardation. She has also taken a personal interest in his physical and mental welfare.

At the beginning of this year Willie was placed in another department with a male teacher, a young, enthusiastic man who is making an intelligent study of this pupil and of the circumstances and environment which have been responsible for his anti-social conduct. He is responding to this wise interest, but is still very much of a problem in his home and at school.

He now attends school regularly, without being forced to go, but is still restless. Sometimes, too, he is annoying, and he continues to laugh aloud frequently.

Discussion

In looking over the period of the boy's life we find many causes that may have contributed to his abnormal behaviour.

Firstly, we have his early childhood and the accident of his birth, coming into the world under the shadow of family shame.

Secondly, the two serious illnesses coming so closely together in his early childhood, with probably complete loss of discipline, followed by an unreasonably impatient attitude toward him after convalescence.

Furthermore, he has grown up under peculiar home conditions, where he has too many in authority over him. He has one person trying to take the place of a mother, and several uncles attempting to take the place of a father, yet with no agreement among them as to his training. One uncle seems to consider corporal punishment the only means of training, and administers it frequently. Another uncle, whom the boy admires immensely, shows indifference to any influence he might have over him.

Another item of far-reaching effect in the building and development of his character is the contrast between him and the children of his uncle. They are more intellectual, and, above all else, they have a real father and mother and are both wanted and loved. Then there is the poor class of boys in his neighbourhood, and, lastly, his slight mental dullness. This dullness does not, to my mind, account for his abnormal conduct; but it probably is a small factor, in that, with higher intellectual ability, the child could be expected to have better judgment.

He has been denied what is the right of every child—parents to love and trust, a sense of security and happiness, so his personality has been stifled and warped, and we call him a problem and an incorrigible. It is not really that *he* is a problem, but that he has problems he cannot solve.

By studying him closely we find him to be a medical case instead of a case for the courts. He is more in need of treatment than of punishment.

His laughing spells and inattention seem to be due to day-dreaming, when he lives in a happy world of his own for a time.

If he can be placed satisfactorily out of his present environment, where he can find fulfilment of his normal desires in reality, he may yet be saved from ultimate mental disease or perhaps a life of crime.

CASE 3: TRUANCY AND THEFT

W. A. is a little boy almost seven years old, of normal intelligence. He had several children's diseases during infancy and at seven months was placed in a hospital because of his undernourished condition with rickets. At the same time his mother entered a hospital for treatment of pulmonary tuberculosis.

The child was in the hospital for about eighteen months, when he was taken to the home of his paternal grandmother, where he remained for more than three years. This woman kept men boarders, who gave the child a good deal of attention. He was allowed to go to the men's rooms, and, if he took money for candy, was laughed at and considered very bright. He listened to the men's conversation and copied their profane language. An only child in the home, he was made much of and had no chance to learn to consider the rights and feelings of others, or to give up to another child. Therefore he naturally continued to be selfish and self-centered.

Soon after he was five years old he was taken home by his parents. By this time there was a new baby in the home, and the parents and sisters were almost strangers to him. The baby was the centre of attraction at home, and W. A. received no more attention than the

other children. He was not used to being ignored and apparently resented it bitterly. He longed for his affectionate, indulgent grandmother and could not understand why he was taken from her. Along with the others, he encountered restrictions to which he, hitherto, was not accustomed.

He told the mother several times that he did not like her, and he frequently ran away from home. He was brought to me by the School Attendance Officer in May of this year, with the complaint that he would not attend school. If taken to school, he would leave at noon and not return either to school or his home until late evening.

By psychometric examination the boy was found to have normal intelligence, and was, himself, interested in the tests. He was attractive in appearance and had a confiding and affectionate disposition. He was found to have a good deal of self-confidence, was egotistic, and also untruthful.

I visited the home on several occasions and found that the mother had an unnaturally vindictive attitude towards the boy. She seemed to relish telling of his stealing money and other articles from her, and of taking bags of nuts from a bakery, as well as tools and other things from the neighbours.

She complained of the boy's vicious temper, and, although he was only six and a half years old at my first visit, said they wanted him placed in a reformatory, since he could not be managed or controlled at home. She could not understand why he was so different from her other children. From people who lived in the other part of the house it was learned that the father also has a violent temper and beats the boy cruelly. This other family moved away because of the boy's destructive and pilfering habits.

The parents were talked to and persuaded that it was natural for the boy to have no love for them when so much of his early childhood had been spent away from them, and also that it was harmful to speak of his faults before him. They were advised not to punish him severely, but to give him treats sometimes, so he would not need to resort to deceit and dishonesty.

Later the family moved to a different part of the city where the neighbours did not know of his bad and unsocial habits, and he had no reputation to live up to, nor to live down. He attended school at first to please his friend the Attendance Officer, who gained the boy's confidence and was of much help to him. Then he kept on going to school because he had become interested.

For some time no complaints have been made about his conduct either at school or at home.

Discussion

We find this child, who has lived for the most impressionable years of his life apart from his family, very different from the other children, both in his conduct and in his attitude towards his parents. His abnormal behaviour seems to have been caused by the lengthy interruption in his home life, his subsequent inability to adjust himself to his changed environment, and to an almost total lack of understanding on the part of his parents.

For a time, it was thought that the only treatment for his delinquency was to take him away from his home. But the results accomplished by keeping him in his home and helping him get adjusted to his own family, together with the changed attitude and better understanding on the part of the parents, have brought about a much more satisfactory result.

Laboratory and Field Methods for the Detection of Mastitis*

PART II†

J. M. ROSELL, M.D.

Chief of the Department of Bacteriology, Oka Agricultural Institute and Veterinary College of the Province of Quebec, University of Montreal

THE BACTERIOLOGY OF CHRONIC STREPTOCOCCAL MASTITIS

TWO classical veterinary books speak of many etiological anato-pathological forms of mastitis, such as catarrhal, purulent, parenchymatous, phlegmonous and gangrenous. In addition to streptococcal mastitis, tuberculous, actinomycotic and staphylococcal forms are also described and reference is made to infection with colon bacilli and members of the *Salmonella* group.

At the Veterinary Convention in Cornell Veterinary College, 1931, Udall expressed the opinion that 99 per cent of the ordinary forms of mastitis are of streptococcal etiology, and this view is generally accepted. In the examination of samples, taken as aseptically as possible from the separate quarters of the udders of 635 diseased cows, I was able to isolate organisms other than streptococci in only 5 instances. In similar examinations of the quarters of healthy udders, streptococci and the so-called "diphtheroid" forms, which will be discussed later, were isolated in only a few cases.

Technique of Obtaining Milk Samples

In a study of the microorganisms associated with any form of mastitis, we often find great difficulty in establishing that the supposed pathogenic germ is actually pathogenic. Furthermore, the ordinary method of taking samples in the stable for bacterial cultures often results in the contamination of the sample from the skin and surroundings of the cow.

To obtain milk as aseptically as possible, particularly if it is desired to submit the milk to a preliminary incubation, the following procedure is recommended: (1) do not attempt to collect samples in a dusty room; (2) rub the flanks, udder and tail with a moistened cloth and prevent contamination by fixing the tails of neighbouring cows; (3) wash the udder with 65 per cent alcohol or antiseptic solution as selected; (4) discard the first milk stream and receive the samples in sterilized tubes,—one stream only being drawn into each small tube. The latter point is significant, as in taking larger samples, about 50 cc., I found that contamination could not be avoided. Owing to the small size of the sample suggested, investigation of several samples may be necessary.

BACTERIOLOGICAL EXAMINATION

Microscopic Examination of Milk Sediment

The typical appearance of mastitis streptococci in milk or milk sediments, especially if the milk has been incubated, is well known. Long or short chain streptococci in milk drawn aseptically with the presence of a number of leucocytes are a diagnostic of mastitis. Certain so-called saprophytic udder micrococci are present without exception in all aseptically drawn milk. Differentiation of these from mastitis streptococci rests on cultural studies.

Technique of Culturing

Two large loopsful (4 mm.) of milk are spread evenly over one half of the surface of 5 per

*Presented before the Laboratory Section at the Twenty-Second Annual Meeting of the Canadian Public Health Association, Saint John, N.B., June, 1933.

†Continued from the March Issue.

cent blood agar plates and Klimmer* or serum glucose agar plates. The plates should be made on the preceding day to permit of the drying of any surface moisture. Incubation is continued for 48 hours. If no growth appears, the plates are inoculated again from the sediment or from incubated milk samples. Good results are also obtained on nutrient glucose serum agar slants. Subcultures are made from the streptococcus colonies in 5 per cent horse serum infusion broth for further study. Poured blood agar plates are equally recommendable.

STREPTOCOCCUS MASTITIDIS

Although different species of streptococci have been found in etiological relation with mastitis and there are well studied isolated cases and epidemics of mastitis produced by different streptococci such as streptococcus pyogenes haemolyticus and streptococcus epidemicus, it is recognized that one species, the so-called streptococcus mastitidis or agalactiae, is responsible for 95 per cent of the ordinary forms of mastitis on both the European and American continents. This organism was first described by Nocard and Mollereau in 1884 and later by Guillebeau in Switzerland. In 1894 the organism was given the name "streptococcus agalactiae" by Kitt. During the past 5 years at the Veterinary School at Oka we (Rosell, Trudel and Brochu) have studied 460 strains isolated from separate quarters of diseased udders and found this streptococcus to be almost constantly present in the diseased udders. In a former study (Miller and Rosell, Bureau of Animal Industry, Washington), similar results were obtained. It may be stated that approximately 97 per cent of the streptococci isolated by us from the diseased quarters, using a strictly aseptic technique, exhibited the cultural characteristics given here below, with some slight variation in a small percentage of strains.

Biological and Cultural Characteristics

An extensive bibliography covering recent studies of this organism is presented in *La Mammite Streptococcique de la Vache*, Rosell, 1932, Department of Agriculture, and in *Mastitis in Cows*, M. E. Whalley, 1932, National Research Council, Ottawa.

Serum broth: 1 per cent lactose, with a pH of 7.2 to 7.4, is used. A flocculent sediment is produced after 16 to 24 hours' incubation, leaving the supernatant liquid clear. Certain short chain streptococci are occasionally found in which the broth remains cloudy. The final pH after 48 hours is 4.4 to 4.5 on glucose broth.

Litmus milk: 7 to 10 per cent litmus is used in this media. It is one of the most valuable for differentiating streptococcus mastitidis from other varieties. When incubated at 37°C. the medium is acidified and reddened in 18 to 24 hours. A homogeneous curd is formed in 20 to 24 hours, with or without the extrusion of a little whey. Striations along the curd are often noted. Frequently a slight reduction of the litmus occurs towards the bottom of a column of coagulated milk, but this never extends higher than half its length. Continued incubation for 3 or 4 days causes the evidence of reduction to disappear. Some strains of streptococcus mastitidis produce coagulation and acidification for the first time after a period of 36 to 48 hours, and some cause a pronounced reduction of litmus only after two or more days. The so-called "lactic" streptococci reduce the litmus rapidly before coagulation occurs,

*Klimmer Agar (Bromcresol purple—sucrose—serum—aluminate agar). Medium.—100 cc. of serum alkali aluminate solution (9 parts of sterile horse serum and 1 part of 15 per cent NaOH solution heated $\frac{1}{2}$ hour in streaming steam, but not neutralized, is made up to 1 liter with 3 gm. Liebig's meat extract, 5 gm. peptone, 10 gm. sucrose, 20 gm. agar, and distilled water in the usual manner, and adjusted to pH 7.2. Add 4 cc. of a saturated aqueous solution of bromcresol purple. Tube and sterilize in autoclave for 20 minutes at 15 pounds' pressure.

Colony Appearance.—"In 25 hours the mastitis streptococci colonies grow to a diameter of 0.5 mm., are dark yellow, almost opaque in the centre, surrounded by a small cloudy border and a larger bright yellow halo. In comparison the bacterio-scopically similar milk-acid streptococci (*S. lactis Lister-Lohnis*) as a rule form quite small, almost colourless, dewdrop-like colonies which do not colour the surrounding medium. Moreover, a colony of mastitis streptococci is like a ball of yarn, somewhat broken on the edge and on this account not sharply rounded."—Klimmer, M., *Tieraerztliche Milchkontrolle* (Richard Schoetz, Berlin, 1929), page 31.

so that only a narrow red ring of unchanged litmus remains at the top of the tube in the first 24 hours. It is very seldom that other varieties of streptococci produce changes similar to those brought about by the mastitis and lactic forms.

Methylene Blue Milk (1 : 20,000)

The majority of strains of streptococcus mastitidis produce no change in this medium. The kind of dye used, however, has some influence.

Splitting Sodium Hippurate

A characteristic of streptococcus mastitidis is its strong capacity to split sodium hippurate.

Fermentation of Sugars

The following sugars are fermented: lactose, sucrose, galactose, salicin, levulose, maltose, trehalose, dextrin, and starch.

The following sugars are not fermented: mannite, inulin, raffinose, arabinose, xylose, and sorbitol.

Some strains do not ferment salicin and a few may be found which may ferment mannite. The fermentation of lactose and sucrose and the non-fermentation of raffinose are of assistance in the differentiation of streptococcus mastitidis from others.

Limitations of Differentiation by Carbohydrate Fermentation Tests

In Holman's classification, a non-haemolytic streptococcus lactose- and salicin-positive, mannite-negative, is designated as *streptococcus mitis*. Strains fermenting lactose, salicin and mannite are grouped as *streptococcus fecalis*. Lactose- and raffinose-fermenting strains negative with salicin and mannite are classed as *streptococcus salivarius*. *Streptococcus mastitidis* would therefore sometimes be considered as *mitis* and sometimes as *fecalis* or *salivarius* if fermenting raffinose. A study, however, of other cultural and biological characteristics of these strains serves to differentiate from *streptococcus mastitidis*. The typical reactions on litmus milk, the non-reduction of methylene blue milk 1:20,000, the strong sodium hippurate splitting, the low final pH on lactose or glucose broth, no growth at 10°C. are, among others, characteristics that differentiate and separate *streptococcus mastitidis* from other more or less related streptococci, such as *mitis*, *salivarius*, *cremoris*, *lactis*, *thermophilus*, *fecalis* and *bovis*.

Carbohydrate fermentations alone cannot be considered as a dependable criterion in a study of streptococci. Lehmann-Neumann-Breed, in *Determinative Bacteriology* (7th edition, New York, 1931), page 112, state:

"It is not advisable to make a too detailed separation of closely related strains according to their power of fermenting sugars. Hopes in this direction have not been fulfilled. The power of fermenting sugar commonly varies when numerous strains of a species are tested and in transfers of a pure culture which are subjected to different environments."

In *The System of Bacteriology*, Research Council, London, 1931 (Vol. 2, page 35), G. W. McLeod, in the chapter, *The Streptococci*, writes:

"Fermentation reactions alone are not a safe guide; since the value of the fermentation of sugars as basis for the classification of streptococci is a rather controversial point, it is necessary to review the literature bearing on it with some care. An arbitrary classification of streptococci based on sugar fermentations is undesirable".

Similar references can be found in the Manual of Topley and Wilson, and in many other classical books.

Blood Agar

Study of the extensive literature on *streptococcus mastitidis* indicates that its non-*Beta*-haemolytic character is generally considered as an outstanding characteristic. Carpenter found, in a study of 76 herds, that haemolytic streptococci constituted only 6 per cent of the group and the non-haemolytic strains 79 per cent. It is his opinion that it is unwise to include the haemolytic strains with the non-*Beta*-haemolytic, to which the name "*streptococcus mastitidis*" has been given. Seelmann, who has made a most extensive study of mastitis, reports that he has not found a single *streptococcus* presenting the typical cultural characteristics of *streptococcus mastitidis* which was haemolytic. Similar statements have been made by Rudolf, Laab, Kollens and others. Recent bacteriological text books (Lehmann-Neumann-Breed, *Determinative Bacteriology*, 1931, page 226; Boecker Kaufmann, Robert Koch, Institute Bacteriologische Diagnostic, 1931, page 69; Hegan, Kolle

Wassermann, Klimmer, Krusse, etc.) describe the streptococci mastitis as non-haemolytic streptococci, or as alpha or gamma haemolytic streptococci. On the other hand, the presence of haemolytic streptococci in mastitis has been reported of frequent occurrence by Jones. Minette found 52 per cent of haemolytic strains in 113 strains of mastitis. In our study of more than 460 strains isolated in Canada and the United States, in 12 cases only have we found *Beta* haemolysis and from several of these in later examinations the presence of haemolytic micrococci as a mixed infection was demonstrated.

In 41 strains isolated with Dr. W. T. Miller in the Bureau of Animal Industry, Washington, and in an approximately equal number of older strains tested, we found only 3 strains showing *Beta* haemolysis, but these did not give the reactions of streptococcus mastitis or agalactiae. The non-haemolytic streptococcus described by Hadley and Frost as streptococcus mitis, and which they consider responsible for the cases of mastitis studied, is exactly the same streptococcus generally known as streptococcus mastitis or agalactiae, as described in European text books. The last two editions of Bergey's *Manual of Determinative Bacteriology* do not consider the streptococcus agalactiae.

In carrying out the testing of haemolysis, we have used (a) the ordinary blood plate method; (b) haemolysis of a 5 per cent suspension of washed red sheep cells, using 1 cc. of broth culture; and (c) haemolysis observed in a disk of blood agar (1 cc.) when transferred to a 24-hour serum broth culture. In poured blood agar plates, deep colonies of mastitis streptococci are frequently surrounded by a zone of incomplete haemolysis which might occasionally be construed as *Beta* haemolysis. It is my belief that investigators reporting strains of streptococcus mastitis as haemolytic have been dealing with strains mixed with micrococci, pyogenic or other haemolytic streptococci. I have found haemolytic streptococci more frequently in mixed market milk than in aseptically drawn milk and haemolytic strains have been isolated from all the surroundings of the cows. In a study of Dr. Hucher and Hansen in the New York Agricultural Station of a large series of streptococci agalactiae of their own and of European and American origins, the characteristics obtained were almost identical with ours and none could be considered as *Beta* haemolytic.¹ In a recent study with Dr. Starkey in the Department of Bacteriology of McGill University, 208 strains of streptococci of different human, animal and milk origins were examined, using all the tests previously described. The results² were in accord with our observations as recorded in this paper.

Animal Inoculation

Differentiation of streptococcus mastitis or agalactiae from other strains is assisted by animal inoculation, using the lactating udder of a guinea pig. Inoculation into the udder is followed by a fibrotic induration which lasts for 2 weeks or longer and is not pathogenic to laboratory animals injected under ordinary circumstances.

DISSOCIATION OF STREPTOCOCCUS MASTITIS

In many cases of mastitis I have not been able to isolate the ordinary types of mastitis streptococci even in repeated tests, nor have I been able to see them in the sediment of fresh or incubated milk samples aseptically taken from diseased udders. I have, however, noted in the sediment smears and in cultures micrococci of a flattened shape with cultural characteristics similar to the saprophytic white udder micrococci. In my earlier studies I

¹Am. J. Pub. Health, 23:1262 (Dec.), 1933.

²Unpublished paper presented at the Laboratory Section meeting of the Canadian Public Health Association, Toronto, December, 1933.

did not consider that these organisms had any etiological relationship with the disease. In some diseased cows I have found only micrococci, and these in greater numbers than in ordinary samples. I am inclined to believe that these cocci may, under favourable circumstances, be an etiological factor in mastitis or that they may have some relationship to *streptococcus mastitidis*. The type of mastitis present is more benign in character than the streptococcal form. In a few other cases atypical forms of *streptococcus mastitidis* have been found and it is not possible to ascertain if they are dissociated forms or constitute separate varieties. On subculturing, evidence in many cases of an association of strains of different biological capacities has been obtained. In earlier studies I concluded that colonies were very often either infected with micrococci or that several *streptococcus* strains existed in the same sample. I believe now that *streptococcus mastitidis*, especially in media not containing blood serum, has a tendency to dissociate into granular micrococci and diphtheroid forms.

Strains which, in the first isolation, appear pure, may, after subculture in media other than serum agar, or serum broth, show divergence of character which causes one to suspect that they are infected. In the dissociated strains rod-shaped forms appear and granular forms of cocci of different sizes resembling closely the white udder micrococci. We have observed in a number of strains the appearance of rods of varying sizes in the chains of streptococci. These forms have been spoken of as diphtheroids. Trudel, Brochu and Gabriel and I have many times observed, in both hanging drop cultures in horse broth and in stained smears, that separate cells in a chain have, by division in 3 or more planes, given rise to a mass of micrococci.

One of my strains, no. 403, has been extensively studied by Francis H. Prissick. This strain, after filtration through Berkefeld N and Chamberland L-3 and L-5 filters, has been recovered from the filtrate and by later planting in suitable media, diphtheroid and coccoid forms were obtained which, on subculturing, gave colonies of streptococci biologically similar to the original strain.

Further evidence of morphological variation in cultures was found in studies with Dr. W.T. Miller in Washington in 1932.

It has been noted that *streptococcus mastitidis* cannot be obtained from the surroundings of the cows and not even from the outside of the teats of the cows suffering from mastitis. In the latter instance, enormous numbers of white micrococci are found. We have suggested, in other papers, that the streptococcus may have a life cycle which would explain this finding. Further, such a hypothesis would explain the failure to the attempt to transmit the infection by spraying streptococci cultures in the teats, on the bedding and on the hands of the milker, whereas it is very easy to infect the cow by instilling the culture into the cistern of the udder.

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THE ANNUAL MEETING

THE City of Montreal has this year been chosen as the annual meeting-place of the Association. The time selected is early June. This combination of circumstances should serve as an admirable background for a most satisfactory convention.

The primary purpose of this yearly gathering is to permit of a more adequate interchange of ideas than is possible by correspondence or formal presentation. These ideas are the result, in the main, of experience, gathered often over long periods of time and usually soundly based. Problems which loom large to you to-day have already been solved in other centres and difficulties which you have overcome are taxing the ingenuity of others.

We made reference above to the value of experience. We often use this term glibly without full appreciation of what it implies. We frequently consider experience merely as skill in operation as the result of repeated doing. The type of experience that we have in mind as possessed by many is broader than this: an aptitude in meeting old and new situations, coupled with knowledge based on a periodic review of achievements and an appreciation of the relationship between cause and effect.

We have inferred a similarity of programmes in many municipalities, common objectives and the same difficulties to be overcome. Discussion of such programmes and problems will bring mutual profit.

The annual meeting further serves as a clearing house for observations and conclusions based on recent work in the field of research and much that is of fundamental interest is presented periodically in this fashion for the criticism and review of the members of the Association.

The joint session on the third day with the Canadian Tuberculosis Association promises to add to the interest of the convention. We as public health workers engaged in specialized fields are sometimes prone

to fail in our appreciation of the fact that the control and prevention of this particular infection requires the united efforts of all those engaged in public health. Tuberculosis and its prevention is not a public health problem which can be divorced from the state or community health effort by mere delegation to the local tuberculosis society and the sanatorium. It is as much a responsibility of the staff of the health department as is the control of smallpox. An early realization of this fact by the health worker will bring corresponding interest from the public and the medical profession. This joint gathering should be helpful to all concerned.

The meeting this year should more than equal any previous gathering not only in the opportunity for discussion but in the character of the scientific programme. It is further planned to permit all those interested to visit one of the nearby health units. Such visit should better exemplify the progress being made in the field of rural health administration in Quebec than any number of didactic presentations.

The social side of the programme is in the hands of our French-Canadian confrères and this statement needs no elaboration.

MEDICAL RELIEF

A LONG with the increase in specialization in the field of medicine has grown up a situation which reached such proportions during the recent economic crisis that it warranted governmental action. When the general practitioner combined the functions of obstetrician, surgeon, paediatrician, anaesthetist and father-confessor; when the radiologist, dermatologist and oto-laryngologist were unheard of, and the physician prescribed with one hand and dispensed with the other, the vast majority of his patients were prepared to pay his modest charges. His fees were more or less in keeping with his investment and frequently he took his pay in kind.

But conditions have changed: fees are higher, consultant and nursing services are out of the reach of many and the fear of illness hangs like a Damoclean sword over the head of the wage earner. In the pre-industrial age the load of the artisan, when ill, was borne in part by his co-workers; now he is a cog in the industrial machine and absence from illness spells replacement. The acuteness of the situation has resulted in many countries in the adoption of health insurance and elaborate machinery to supply sickness benefits has been devised. But no such machinery effectively operates in Canada as yet.

We have implied that in so-called normal times there was a growing feeling that something should be done to ensure adequate treatment for all, irrespective of their ability to pay. But what of the present

out-of-the-ordinary times? It has been demonstrated that, despite a lowered general mortality rate during the last two years, there has been found to be a very appreciable increase in sickness among those who, prior to 1929, were financially able to take care of their medical needs but must now seek gratuitous service. We have, therefore, not only an increase in the number unable to contribute towards their own medical care, but an increase in the need for such care. How has this situation been met?

Measures to lighten the load of the physician and ensure medical care to those unable to pay for such service have been put into effect in many centres. The responsibility for the initiation of such measures has rested largely on the provincial governments, the federal authorities merely supplying the blessing. The plan when accepted by the municipalities has made possible a programme of medical relief whereby a minimum amount is assured the practitioner for such service. The size of the amount has brought protests in centres where the pinch was most seriously felt and various compromises have been arrived at on occasion.

What are the implications of such a programme? First, that there is a realization on the part of municipal and state authorities as to their responsibility in the care of those temporarily indigent; second, that such responsibility would appear to be hesitatingly assumed; and third, that the profession is unable to continue to carry unaided the burden of gratuitous service to those unable to pay.

But what of the future? When conditions improve, is the physician prepared to continue to carry the load implied in his Hippocratic oath, whereby none shall go unattended? Will governments be permitted to discontinue this gesture at state responsibility, in face of the fact that even in normal times probably forty per cent of the public cannot afford to pay for the maximum of medical service; or should we cut down this percentage and refer to minimum service? The answer can best be found in a further question: "Is medical relief the forerunner of state medicine?"

Twenty-Third Annual Meeting
MONTREAL
June 11, 12, 13, 1934

Canadian Public Health Association

TWENTY-THIRD ANNUAL MEETING MONTREAL, QUEBEC JUNE 11th, 12th, 13th, 1934

THE holding of the Association's twenty-third annual meeting in Montreal in conjunction with the annual meeting of the Canadian Tuberculosis Association will afford members the opportunity of seeing at first hand the functioning of one of the largest municipal health departments. The programme committee has set aside one afternoon of the three days of sessions to permit members to visit the divisions of the city health department in which they are especially interested. Through the co-operation of Dr. S. Boucher, Medical Officer of Health, a detailed programme of visits is being arranged.

Those who are interested in sanitation will have the opportunity of studying the water supply, including the aqueduct system through which the water is conveyed from the St. Lawrence River at a point seven miles from the city, the modern mechanical and slow sand filtration plants and the unique pumping system. For members of the Laboratory Section visits have been arranged to the provincial and municipal laboratories, where demonstrations will be provided. A special tour is planned for those interested in milk and food control. The widespread activities of the Department of Public Health Nursing, of the organized clinics and of the system of school medical inspection will be presented and suitable visits arranged. Through the Provincial Bureau of Health, those desiring to see the work of a typical full-time health unit as

THE HONOURABLE L. A. DAVID, K.C.
Provincial Secretary, Quebec; Honorary
President, Canadian Public Health
Association.

organized in Quebec will be afforded this opportunity in a visit to one of the adjacent counties. The local committee is to be congratulated on introducing this programme of field visits as one of the general sessions of the convention.

Major public health problems are being selected for the remaining two general sessions and the Sections are providing timely, practical programmes. The programme committee is particularly pleased to announce that Dr. Haven Emerson, Professor of Public Health Administration in Columbia University, New York, President of the American Public Health Association, and Dr. John A. Ferrell, of the Rockefeller Foundation, will be among the speakers.

Canadian Tuberculosis Association

ANNUAL MEETING MONTREAL, QUEBEC JUNE 11th, 12th, 13th, 1934

The sessions of the Canadian Public Health Association will open on Monday, June 11th, with a meeting of the Vital Statistics Section in the morning, the opening general session in the afternoon, and a meeting of the Executive Council in the evening. Meetings of the Laboratory, Public Health Nursing, and Vital Statistics Sections have been planned for Tuesday morning, and on both Tuesday and Wednesday mornings clinical programmes will be provided by the Canadian Tuberculosis Association. On Tuesday afternoon the general session of the health association will take the form of field visits and members will have the opportunity of visiting the Montreal Department of Health and the Provincial Bureau of Health. The Canadian Tuberculosis will also hold a session on Tuesday afternoon. The



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Medical Superintendent, Lake Edward
Sanatorium, Quebec; President, Can-
adian Tuberculosis Association.



DR. ALPHONSE LESSARD
Director, Provincial Bureau of Health,
Quebec; President, Canadian Public
Health Association.

annual dinner of the Canadian Public Health Association will be held on Tuesday evening, and the guest speaker will be the Honourable L. A. David, K.C., Provincial Secretary of Quebec. The Association will devote Wednesday morning to a joint meeting of the Sections of Public Health Nursing and Mental Hygiene, and meetings of the Public Health Engineering and Vital Statistics groups. The co-operation of the Canadian Tuberculosis Association in planning the programme has made possible the arranging of a joint session on tuberculosis for Wednesday afternoon.

The historic Windsor Hotel will be convention headquarters for both associations. Other conveniently located hotels include the Mount Royal, the Ritz-Carlton, the Queen's, the Place Viger, the LaSalle and the Ford.

Preliminary Programme

ONTARIO CONFERENCE

CANADIAN PUBLIC HEALTH ASSOCIATION
ONTARIO HEALTH OFFICERS' ASSOCIATION
(TWENTIETH ANNUAL MEETING)
ONTARIO MEDICAL ASSOCIATION
Royal York Hotel, TORONTO
May 28 to June 1, 1934

Daylight Saving Time

MONDAY MORNING—CONCERT HALL

9.00 a.m. Registration.

10.15 a.m. 1. "Efforts in Health Education in a Small City"—Dr. D. V. Currey, Medical Officer of Health, St. Catharines.
Discussion.
2. "Compensable and Non-Compensable Diseases in Ontario"—Dr. J. G. Cunningham, Ontario Department of Health.
3. "Recent Health Legislation in Ontario"—Dr. W. J. Bell, Deputy Minister of Health.
Discussion.
Appointment of Committees.

MONDAY AFTERNOON—CONCERT HALL

2.15 p.m. 1. Address of Welcome—His Worship, Mayor Stewart.
2. Presidential Address—Dr. J. J. McCann, Medical Officer of Health, Renfrew.
3. "What are the Objectives of a Public Health Programme and What is the Local Medical Officer of Health Doing towards Attaining those Objectives?"—Honourable John M. Robb, Minister of Health and Labour.
4. "What the Dairymen Expect from the Medical Officer of Health"—Mr. W. C. Forster, President, National Dairy Council of Canada.
5. "Tuberculosis—Problems Associated with Diagnosis"—Dr. G. C. Brink, Ontario Department of Health.

6.30 p.m. Round Table Conference—Dinner—Roof Garden.

Topics: (1) "Cost of Health Services in Comparison with Other Municipal Activities"—Dr. J. T. Phair.
(2) "Screening to Determine Who is Eligible for Free Health Service"—Dr. F. J. Conboy.
(3) "Health Demonstration in Eastern Counties"—Dr. W. J. Bell.
(4) Statement regarding Quarantine Period for Scarlet Fever—Dr. A. L. McKay.

TUESDAY MORNING—PRIVATE DINING ROOMS

9.15 a.m. Demonstrations.

Plan: Each demonstration will take 40 minutes; 10 minutes will be allowed for change. The schedule will be strictly adhered to; each demonstration will close promptly and will open sharp on time.

1. *Sanitary Engineering:*
(a) Interpretation of Water Analyses.
(b) Milk Control Problems.
(c) Drainage Problems and Nuisances.
2. *Laboratories:*
(a) Hints on Submitting Specimens.
(b) The Combined Dark Field Outfit.
(c) Food Inspection—Parasitic and Diseased Lesions in Meat.
(d) Microphotographs—some of the Common Pathogenic Organisms.

3. *Preventable Diseases:*
Tuberculosis—Skin Test; Medical Examination of Patient (10 minutes); X-ray Films.
4. *Preventable Diseases:*
Administration and Interpretation of Dick Test, Schick Test, Vaccination and Smallpox Immunity Reaction.
5. *Industrial Hygiene:*
 - (a) Dust Determination.
 - (b) Lighting.
 - (c) Carbon Monoxide.
6. *Dental Services:*
 - (a) How to make a Mouth Inspection.
 - (b) Interpretation of X-rays of the Mouth.
 - (c) Mouth Conditions May Cause Systemic Infection.

TUESDAY AFTERNOON—CONCERT HALL

2.15 p.m. 1. "Ice Supplies and Associated Health Problems"—Dr. A. E. Berry, Ontario Department of Health.
 2. "Trench Mouth, a Public Health Problem of Major Importance"—Dr. Harold K. Box, Honorary Consultant to Ontario Department of Health.
 3. "Insurance and Public Health"—Mr. H. H. Wolfenden, Consulting Actuary and Statistician.
 4. "Syphilis, Diagnosis and Treatment"—Dr. A. L. McKay and Dr. A. L. McNabb, Ontario Department of Health.
 5. "Report on 100 Obstetrical Cases in a Rural Practice"—Dr. A. F. McKenzie, Monkton, Ontario.
 Repcrts and resolutions; elections of officers.

WEDNESDAY, MAY 30th

Joint Meeting with the Ontario Medical Association*.

DIVISION A

9.30 a.m. 1. "Practical Antirachitic Measures—The Relative Value of Cod Liver Oil, Viosterol and Irradiated Milk"—Dr. T. G. H. Drake, Toronto.
 2. "Recent Investigations in Whooping Cough"—Dr. D. T. Fraser and Dr. L. N. Silverthorne, Toronto.
 3. "Behaviour Problems in Children"—Dr. W. E. Blatz, Toronto.
 4. "Scarlet Fever"—Dr. Beverley Hannah, Toronto.
 5. "Early Diagnosis Essential for the Prevention and Treatment of Tuberculosis"—Dr. W. J. Dobbie, Weston.
 6. "Prognosis in Dry Pleurisy and Pleurisy with Effusion"—Dr. D. W. Crombie, London.

DIVISION B

9.30 a.m. 1. "Congenital Lesions of the Genito-Urinary Tract"—Dr. R. M. Wansbrough, Toronto.
 2. "The Co-relation of the Pathological and the Surgical"—Dr. J. K. McGregor, Hamilton.
 3. "Transurethral Resection of the Prostate"—Dr. J. C. McClelland, Toronto.
 4. "Manipulative Surgery"—Dr. W. J. Gardiner, Toronto.
 5. "The Prevention of Goitre"—Dr. Alex Sinclair, Sault Ste. Marie.
 6. "Electro-Cardiography in General Practice"—Dr. Ford Connell, Kingston.

12.45 p.m. Luncheon. Speaker to be announced later.

WEDNESDAY AFTERNOON

2.30 p.m. 1. "Haematuria"—Mr. J. Swift Joly, London, England.
 2. "Corrective Helps for Progressive Deafness"—Dr. Gordon Berry, Worcester, Mass.
 3. "Maternal Welfare in Ontario"—Dr. W. B. Hendry, Toronto.
 4. "Maternal Mortality in Ontario—A Statistical Study"—Dr. J. T. Phair and Dr. A. H. Sellers, Toronto.

4.00 p.m. Garden Party.

7.00 p.m. Alumni Dinner—Class Reunions.

*The complete programme of the Ontario Medical Association Meeting will be found in the April Bulletin of Association.

QUARTERLY LETTER FROM GREAT BRITAIN

GEORGE F. BUCHAN, M.D., F.R.C.P., D.P.H.

London

GOVERNMENT MEDICAL OFFICERS

SINCE my last letter the Public Health Service of Great Britain has lost by retirement three of its prominent members associated with the Central Government Departments, namely, Sir George Buchanan of the Ministry of Health, Dr. Ralph Crowley of the Board of Education and Dame Janet Campbell who held a position in both departments.

Sir George Buchanan had been a Medical Officer of the Central Government for something like forty years. His work was mainly in connection with international health and latterly he was President of the Permanent Committee of the Office International d'Hygiène Publique in Paris and Vice-President of the Health Committee of the League of Nations. Although Sir George is known by name and reputation throughout the British Dominions, it was the privilege of few of us to know him personally, as he was much abroad. He has all the polish of an ambassador, is a man of great charm, popular wherever he goes and well beloved when well known. On account of his immense knowledge of men and affairs his advice to his junior colleagues, ever readily given, was always very helpful and much appreciated. The Service in this country is the poorer for his retirement but we all hope that he will long enjoy his well earned leisure.

Dr. Ralph Crowley was Senior Medical Officer of the Board of Education. He entered the Medical Department of the Board when school medical inspection became compulsory in this country in 1907 and since that time he has been Sir George Newman's right hand man. The rank and file generally are never aware exactly to whom the development of any public service is due but those of us who

know Dr. Crowley fully realise that no person in this country could have furthered the ideals of his great chief with more ability and discretion.

Dame Janet Campbell was well known as Senior Medical Officer of the Maternity and Child Welfare Department of the Ministry of Health. She was also known in some of the Dominions where she went to advise on this particular section of health work and she took a leading part in the Health Committee of the League of Nations. The Maternity and Child Welfare Department of the Ministry of Health is one of the most important departments of the Ministry. It is one which she fashioned and it is certain that a sure structure of National Health will be built up by her successors on the foundations which she so truly laid.

THE HEALTH OF THE SCHOOL CHILD

IT is not unfitting that I should refer to the vacation of the office of Senior Medical Officer of the Board of Education by Dr. Crowley at a time when, as I stated in my last letter, I proposed to refer to the latest Annual Report of Sir George Newman on the Health of the School Child in Great Britain. This report deals with the year 1932.

In the introductory chapter Sir George Newman draws attention to the fact that medical supervision of the school child forms an integral part of the national services on behalf of the Public Health. Taking England and Wales as a whole, 1,341 school medical officers are employed, of whom 959 are whole time for public health or school medical work; in addition there are 999 specialist officers, 774 dentists and 5,630 nurses. During 1932, 1,845,500 routine inspections were carried out, and the in-

cidence of some of the more important defects per 1,000 inspections included malnutrition 10.7; defects of vision 85.6; otitis media 4.7; enlarged tonsils and adenoids 51.2; organic heart disease 1.7; nervous conditions 1.9; and deformities 9.8.

These results are not perhaps altogether satisfactory because it might be thought that with child welfare work leading into school work, relatively few defects should be found amongst school children. Nevertheless investigation shows that where infant welfare work is most advanced there we find the fewest defects among school entrants. There is a financial stringency at the present time which prevents rapid development but it must always be remembered, as Sir George Newman points out, that money spent on the prevention and cure of defects in childhood is merely equivalent to a long dated investment capable of giving a very large return on maturity.

In the Report considerable space is devoted to physical training and is followed by an addendum on the posture of school children, based on the report of a special inquiry arranged by the medical department of the Board. In this report the observers found that only 11.4 per cent of the children inspected had good posture, whereas 51.8 per cent were grouped as medium, and 36.8 per cent as poor. Curiously enough, there was more good posture in urban areas and more poor posture in rural areas. The stouter the build of the child the better the posture. The evidence suggests that the contributory factors in the causation may be (a) poor home conditions such as overcrowding, lack of sleep, inadequate and unsuitable feeding; (b) unsatisfactory school conditions including bad lighting and ventilation and unsuitable desks; (c) the absence of adequate physical exercise and the practice of hygiene; and (d) disease such as rickets. In this connection it may be noted that the Board has recently issued another

edition of the syllabus of physical training in which fresh exercises and revised methods of teaching have been introduced with a view to the special encouragement of good posture.

THE TEACHING OF HYGIENE

THE teaching of hygiene in schools has been brought forward another step by the issue of a booklet, a guide book, of *Suggestions on Health Education*. Its chief purpose is to encourage teachers to create in the minds of boys and girls during the years of adolescence an understanding and cultivation of health. The headings of the chapters give a good idea of the subject matter and the ground covered, and include "Conditions of Bodily Health", "The Hygiene of Food and Drink", "The Practice of Healthy Habits", "Mothercraft and Infant Care" and "Conditions of a Healthy Environment". It is a book which will well repay perusal by all interested in this important subject.

HOSPITAL CONSTRUCTION

THE hospitals of the old Boards of Guardians, who were abolished by the Local Government Act, 1929, were taken over by certain of the public health authorities in April, 1930, when the Act became operative. This change in the administration of the hospitals has led to an examination of the hospital accommodation required for the community as a whole. Arising out of this considerable discussion has recently taken place as to hospital construction. At the present time a committee of the Ministry of Health is engaged in endeavouring to reach some general principles as a guide to the building of hospitals. I think it is commonly the case that medical superintendents of hospitals try to make the best use of the buildings given to them and proceed to devote most of their attention to the medical requirements of their patients. The time has come, however, when medical superintendents must take

part in determining how hospitals should be fashioned. It is obviously not easy to say exactly how a hospital should be planned as respects linear distance between patients, floor space, cubic space, lighting, ventilation, heating, ward kitchens, etc., having regard to the medical, nursing and domestic needs of the patients and the necessary desire for economy and efficiency on the part of the hospital committee. Obviously there can be no final solution, but general principles and concepts should be laid down. The report of the Departmental Committee is in all the circumstances eagerly awaited and it is hoped that it will serve as a general guide to those of us who are wrestling with some problem of hospital construction in some particular locality.

LOCAL GOVERNMENT LAW

I HAVE just stated that recently a change in Local Government has come about, bringing with it to public health authorities many new problems. The whole matter of Local Government Law and Administration in England and Wales is very complex. It is certain that codification and unification of the various laws are required but pending the legislation necessary to this end, a band of workers under the general editorship of Lord Macmillan, a Lord of Appeal in Ordinary, has set itself the task of bringing together under various subject headings the Law as it relates to the particular subjects with which a Local Authority may be required to deal. The first

volume of this work has just been issued. The work is one which, when completed, will enable workers in this country and in the Dominions to grasp readily and at once the powers possessed by Local Authorities in England and Wales for dealing with any particular matter without the amount of research and cross reference which has hitherto been necessary. It will be found a very valuable guide to all interested in Local Government and public health in this country.

THE R.S.I. CONGRESS

THE Royal Sanitary Institute Congress, which is the most important public health congress in Great Britain, takes place in Bristol from the 9th to the 14th July. This year I have the honour to be the Chairman of the Council of the Royal Sanitary Institute and I can assure my Canadian colleagues that during the week in Bristol the programme of the Congress will provide excellent opportunities for discussion and for an interchange of views between sanitarians of every kind and description from all over the world. The value of visits to places of public health importance in the neighbourhood of Bristol is not forgotten and the social side of the Congress is not overlooked. I am looking forward to the sojourn of national and international public health workers for a week in Bristol in July as an event of great importance. I need scarcely say that any of my Canadian colleagues who can attend will be most heartily welcomed.

TWENTIETH ANNUAL MEETING
Ontario Health Officers' Association

ONTARIO CONFERENCE
Canadian Public Health Association
Ontario Medical Association

TORONTO, MAY 28th—JUNE 1st

LABORATORY SECTION

The Degree of Protection Provided by Tetanus Toxoid

P. A. T. SNEATH, M.D., D.P.H.

Connaught Laboratories, University of Toronto

THIS communication records the degree of protection developed in guinea-pigs, rabbits, horses and man in response to tetanus toxoid. This protection is measured by the resistance to toxin in multiples of the minimal lethal dose, or by titration of the antitoxin in the blood serum.

The toxoid (with the exception of one lot received from the Pasteur Institute, Paris) was made in the Connaught Laboratories by adding formalin (40 per cent formaldehyde) to a concentration of 0.3 per cent, to fresh toxins lethal to guinea-pigs in doses of 0.00002 to 0.00005 cc., and incubating the mixtures at 37° C. until 5 cc. injected subcutaneously in guinea-pigs failed to induce any signs of tetanus.

Guinea-pigs

In Table I are shown the results of giving toxin in multiples of the minimal lethal dose to guinea-pigs which had been given tetanus toxoid one month previously. The minimal lethal dose regularly kills normal guinea-pigs within 4 days, leaving no survivors. In 67 guinea-pigs which had been given 5 cc. of toxoid one month previous to administration of 5 to 50 lethal doses of toxin, only two deaths occurred, one from 15 and one from 50 lethal doses. The death from 15 lethal doses was very definitely delayed. Hypertonicity or spasm developed in 9, but these recovered, and 56 survived the test without showing any evidence of tetanus. It is to be noted that even 5 lethal doses produced signs of tetanus (hypertonicity or spasm) in 4 of the 36 guinea-pigs

given this amount, although a few tolerated well 25 to 45 lethal doses.

The pooled serum of a group of guinea-pigs taken one month after being given 5 cc. of toxoid showed a level of $>0.01 < 1.0$ units per cc.*

Probably more striking is the degree of protection observed in 20 guinea-pigs that were given 1 cc. of toxoid, and, one month later, from 5 to 25 lethal doses of toxin. No deaths occurred in this group; 6 showed evidence of tetanus but recovered, and 14 survived without showing any ill effect. The fact that 20 guinea-pigs, after receiving 1 cc. of toxoid, survived 5 to 25 times the minimal lethal dose of toxin appears very significant.

Although the various doses of toxoid were arranged as shown in the table, in order to determine the relationship of the amount of antigen to the degree of protection, the experiment was not successful, on account of the variability in response encountered. While there is a suggestion that the larger doses induced a greater degree of protection, the data are too few to justify definite conclusions in this regard.

Rabbits

The rabbit, though much less susceptible to tetanus than the guinea-pig, produces antitoxin in response to tetanus toxoid. Five rabbits, each given a total of 2 cc. in 3 doses at intervals of 3 weeks, showed, 38 days after the last dose, the following unitage of antitoxin per cc. serum: 1, 0.5, $>0.3 < 0.5$, $>0.2 < 0.3$ and 0.2, respectively. Three rabbits given a total of 2.5 cc. showed 1, 0.1 and 0.1

*The symbols $>$ and $<$ signify "more than" and "less than", respectively.

TABLE I

RESULTS OF GIVING TETANUS TOXIN TO GUINEA-PIGS 1 MONTH AFTER TETANUS TOXOID

Amount Toxoid	Test dose of Toxin	No.	Survivors		Tetanus deaths
			Without signs of tetanus	With signs of tetanus	
5 cc.	5 M.L.D.	36	32	4	0
	10 "	14	11	3	0
	15 "	3	2	0	1
	20 "	6	5	1	0
	25 "	3	2	1	0
	30 "	1	1	0	0
	35 "	1	1	0	0
	40 "	1	1	0	0
	45 "	1	1	0	0
	50 "	1	0	0	1
		67	56	9	2
3 cc.	5 M.L.D.	4	3	1	0
	10 "	4	4	0	0
	15 "	2	1	0	1
	20 "	4	3	0	1
	25 "	2	0	2	0
	30 "	2	2	0	0
	40 "	2	2	0	0
		20	15	3	2
1 cc.	5 M.L.D.	4	3	1	0
	10 "	4	4	0	0
	15 "	4	3	1	0
	20 "	4	4	0	0
	25 "	4	0	4	0
		20	14	6	0

TABLE II
RESPONSE OF HORSES TO WEEKLY DOSES OF TETANUS TOXOID

Horse Number	Tetanus antitoxin titre 7 days after weekly dose (units)					
	1st	2nd	3rd (weeks)	4th	5th	6th
411	<0.1	<0.1	<0.1	>0.1	>0.1<1.0	>1.0
412	<0.1	<0.1	>0.1	0.1	<1.0	1.0
415	<0.1	<0.1	>0.1	1.0	>10.	20.
416	<0.1	<0.1	>0.1	>0.1<1.0	>1.0	...
418	<0.1	...	<0.1	0.1	<1.0	>0.1
419	<0.1	<0.1	<0.1	0.1	...	<1.0
420	<0.1	<0.1	>0.1	>1.0	>1.0	20.
421	<0.1	<0.1	>0.1	1.0	>1.0	>10.

unit per cc. serum 35 days after the last dose; and two rabbits receiving a total of 4 cc. in 3 doses showed <1.0 and 1.0. Five rabbits were each given 36 cc. of toxoid A in 8 doses over a period of 2 months. Sixteen days after the last dose the pooled serum showed $>2.5 <5.0$ units per cc. The pooled serum of 4 rabbits treated similarly with toxoid B showed $>1 <2.5$ units per cc.

The influence of a primary stimulus in tetanus immunization was demonstrated in 2 rabbits. Seven months after the previous dose of toxoid, the antitoxin level was less than 0.1 unit per cc. Two months later (9 months after the previous dose), they were given 1.5 cc. of toxoid. In 9 days, one showed >0.5 units per cc. and in 21 days the two showed $>1.0 <5.0$ and $>0.1 <0.5$ units, respectively—levels far exceeding those attained after the primary dose of toxoid.

Horses

Horses are extremely susceptible to tetanus and, in immunization for the production of tetanus antitoxin, occasionally develop tetanus from the initial small doses of toxin commonly used. By the time a titre of 1.0 unit per cc. has developed, the horse may be given toxin without fear of producing tetanus. In fact, an antitoxin level of 0.1 unit per cc. will protect against many fatal doses. Table II shows the development of antitoxin in response to toxoid. It is evident that in a short time a level of antitoxin is attained, and attained without any attendant danger of producing tetanus, which permits more intensive hyperimmunization with toxin.

Even one dose of tetanus toxoid may induce a very significant protection in the horse. Four horses were given 100 cc. of toxoid. Three weeks later each was given 200 cc. of potent toxin with an original titration of 20,000 guinea-pig minimum lethal doses per cc. Had such a dose, or less than 1/100 of the dose been given

to normal horses, it is reasonable to assume that all would have been dead from tetanus within a few days. Of the 4, 3 survived (one without showing any signs of tetanus and two after demonstrating some local spasm), and one died. The three survivors are, therefore, striking evidence of the protection induced by the single dose of tetanus toxoid.

Man

In a previous communication (1), the levels of antitoxin developing in 29 adults following three subcutaneous doses of tetanus toxoid were received. In 28 of the 29, antitoxin in significant amounts had developed, 20 showing the high level of 0.1 unit or more per cc. Five to 8 months after the last dose, 13 continued to show a level of 0.1, 12 a level of 0.01, two 0.001, while in two the level was below 0.001 unit per cc., the lowest level for which measurement was made. In order to obtain an estimate of the relative protection afforded man by such levels of antitoxin, the blood antitoxin of 9 individuals following the administration of the usual prophylactic dose of antitoxin (1,500* American units) was determined. Approximately 72 hours after intramuscular administration, the level was 0.1 or $>0.1 <0.25$. The serum from 2 of these was obtained later, showing in one week a level of >0.1 and $>0.01 <0.1$, respectively, and in a fortnight >0.1 and $>0.01 <0.1$; in 4 weeks the level in one was investigated and was <0.001 unit. It is evident, therefore, that the protection, as far as antitoxin level is concerned, afforded over a long period of time by 3 doses of toxoid is quite comparable with that provided for a very short time by a prophylactic dose of antitoxin. Of equal or more importance, however, is the fact that individuals who have received a primary stimulus of toxoid, have in general the ability to develop antitoxin in response to the antigen at a much faster rate and to a higher level than obtains in

*The excess may account for as much as 1,950 units in the containers.

the individual not so protected. As shown by Ramon (2) and confirmed in this laboratory, horses, which had been given a single dose of tetanus toxoid and some months or years later subjected to immunization, showed the development of a very high level of antitoxin in a few weeks. In fact, in such horses with a primary stimulus a higher level of antitoxin developed in five weeks than would develop in horses without the primary stimulus in six months. Our experience (3) indicates that the influence of the primary stimulus in man is similar to that in the horse. Therefore, although the antitoxin, after toxoid, is not necessarily maintained at a high level, the vaccinated (toxoid) individual retains the ability to produce with extraordinary rapidity large amounts of antitoxin.

CONCLUSIONS

Antitoxin develops to significant levels in guinea-pigs and rabbits in response to tetanus toxoid, but the variability of the response between individual animals is such that adequate numbers must be used for determination of antigenic value.

In spite of some variation in the degree of response to tetanus toxoid, the antibody production in horses and man is such that tetanus toxoid may be advocated for active immunization whenever such immunization is desirable.

REFERENCES

1. Sneath, P. A. T. *J.A.M.A.*, 102: 1288 (April 21), 1934.
2. Ramon, G., and Lemetyayer, E. *Compt. rend. Soc. de Biol.*, CXI: 872 (Dec. 16), 1932.
3. Sneath, P.A.T. To be published.

NEWS FROM THE FIELD

Congress of the International Union Against Tuberculosis

THE ninth conference of the International Union against Tuberculosis, of which Professor Leon Bernard is secretary general, will be held in Warsaw on September 4, 5 and 6, 1934. The discussion will be limited to three main subjects: "Biological Variations of the Tubercle Virus" (Professor Karwacki, Poland), "Tuberculosis of the Bones and Joints: Treatment, Medical and Surgical" (Professor Putti, Italy), and "The Use and Organization of Tuberculosis Dispensaries" (Professor Leon Bernard, France). Ten speakers selected in advance from a list presented by the 43 countries belonging to the Union have been designated to open the discussion on each of the questions on the agenda. Information regarding special hotel and railway rates and other details may be obtained from the Canadian Tuberculosis Association, 304 Plaza Building, Ottawa.

Annual Congress of the Royal Sanitary Institute

THE forty-fifth health congress and exhibition of the Royal Sanitary Institute will be held in Bristol from July 9th to 14th under the presidency of Stanley H. Badcock, I.L.D., J.P., pro-chancellor and treasurer of the University of Bristol.

Annual Meeting American Public Health Association

THE American Public Health Association will hold its sixty-third annual meeting in Pasadena, California, September 3-6, 1934. The Western Branch of the Association, with a membership of more than 1,200 from eleven western states, will hold its 5th annual meeting at the same time.

British Columbia

D. R. C. P. Brown, formerly in charge of the quarantine station

at Williams Head, Victoria, has been appointed in charge of quarantine services for Canada, succeeding Dr. J. D. Pagé, who has retired following many years of active service and under whose direction the quarantine service was so greatly strengthened.

Alberta

THE Okotoks-High River and Red Deer Full Time Health Districts have almost completed the three-year demonstration period for which they were established. It is a tribute to the rural full-time health district movement in general, and to the work done in these districts, that the contributing municipalities have agreed to continue the operation of the districts and to double their present contributions.

In accordance with its usual policy, the Provincial Department of Health has broadcast a series of health talks throughout the winter months. The University station CKUA, with its province-wide hook-up over the Foot-Hills chain, has made it possible to reach the entire province. The response, as evidenced by the mail received, would indicate that considerable public interest has been created in matters of public health.

Saskatchewan

DR. R. W. Kirby, superintendent of the Prince Albert Sanatorium, Prince Albert, is spending six months in post graduate work in London, England. Dr. C. H. Andrews, formerly of Fort San, is acting superintendent.

Manitoba

DR. A. Roy, D.P.H., has been appointed health officer in charge of the full-time health unit of the city of St. Boniface. The establishing of this unit marks the further progress of the organization of full-time health units in Manitoba.

Ontario

THROUGH the co-operation of various agencies, the week of April 8th was set aside as the Ontario Crippled Children's Week. It is estimated that there are still 2,000 children in the province who are in need of medical treatment. An effort is being made to discover such children and to arrange for their rehabilitation.

Quebec

IT was with deep regret that the many friends of Dr. Arthur Rousseau, dean of Laval University Faculty of Medicine, learned of his death on January 15th after a short illness. During his long and distinguished career Dr. Rousseau took an active part in the efforts to control tuberculosis and served as president of the Canadian Tuberculosis Association in 1925.

Nova Scotia

NOVA SCOTIA now has 544 hospital and sanatorium beds available for the treatment of tuberculosis as a result of the efforts to meet the needs of the province. This is a higher ratio per capita than that of any other province in Canada.

OF ENGINEERING INTEREST

ANNUAL REPORT OF THE KITCHENER WATER COMMISSIONERS

THE annual report for 1933, the thirty-fifth year of municipal ownership of the waterworks, is a

comprehensive statistical report, containing very interesting data.

Of special interest is the fact that Mr. J. C. Breithaupt has been a member of the Commission continuously

since its inception and has been chairman for all but one year. The other commissioners have served 26 years, 25 years and 14 years, respectively; a real tribute to their abilities and to the satisfaction with which this system has been administered. With this must go the name of their very efficient superintendent, Mr. M. Pequegnat.

In the thirty-five years since the plant was purchased many real accomplishments have resulted. Cost comparisons for this period are very interesting. The value of plant has increased from \$102,000 to over \$800,000. In spite of this, however, the cost of water to the consumer is lower in nearly every classification. The minimum house rate has been reduced from \$2.02 to \$1.44 per quarter, the metered rate per 1,000 gallons from 27 cents to 17.3 cents, and hydrant rental from \$45 to \$35. Only in the rate for the large consumers has there been a slight increase in the still very reasonable rate.

Over 99.5 per cent of the consumers are metered. The average daily consumption of water is over $2\frac{1}{2}$ million gallons; the number of consumers, 6,798; the per capita consumption, 81; the length of mains, 66 miles; and the balance of earned surplus on December 31, 1933, \$231,331.96.

This report clearly demonstrates what can be accomplished by a water commission when an earnest effort is made to give public service and administer the system in an efficient manner.

INTERESTING LEGISLATION

LEGISLATION has been passed in the Ontario House which will permit the city of Oshawa to appoint a "city administrator" who shall have general control and management of the administration of the city's government. This is another municipality in which the city manager plan apparently is considered desirable. While the number in Canada does not appear to be great, some very satisfactory results have been obtained.

The city of Brantford has also ap-

plied to the legislature for authority to create a Public Utilities Commission, and to entrust such commission with the management and control of all public utilities in the city. This is in line with the action of many other municipalities of the province.

WATER SHORTAGE

A NUMBER of municipalities are experiencing difficulties this year in securing adequate quantities of water from their public systems. The long spell of cold weather has lowered the ground water, and where the supply is drawn from shallow wells or springs the available quantity has been affected. This deficiency emphasizes two important features: firstly, the need for proper protection and supervision of any emergency supply used, and, secondly, the advisability of taking steps towards a permanent solution of the problem. Chlorination is a useful emergency treatment and should be employed when there is any doubt as to safety. Temporary equipment may be set up or chlorinators may be rented at a nominal sum. The health officer and the Provincial Department of Health should be consulted about these changes. The development of an additional supply of water requires time but action should be taken in this to avoid future difficulties. New wells, intakes and similar changes may be necessary.

FREEZING DIFFICULTIES IN WATER-WORKS SYSTEMS

MOST unusual conditions have been met this winter in the freezing of water mains and services. The field staff in most municipalities has been kept busy thawing mains and repairing leaks. The frost has penetrated great depths, varying with the locality and the covering of snow. A depth of seven feet has been reported in one city and this probably has been exceeded in others. It will be interesting to learn of the methods used in the different centres to meet this problem.

BOOKS AND REPORTS

A Standard Classified Nomenclature of Disease. Compiled by the National Conference on the Nomenclature of Disease. Edited by H. B. Logie, M.D. Published by the Commonwealth Fund, 41 East Fifty-seventh Street, New York, N.Y., 1933. XVII + 702 pages. Price \$3.50.

Reliable statistical information on morbidity and mortality can be made available to clinician and research worker only through the adoption of a standard of medical terminology for national or international use in the compilation of medical records. The importance and value of a standard classification are appreciated by every clinician and hospital administrator.

This *Nomenclature of Disease* is somewhat larger than previous ones, merely because it is more complete. It is precise and comprehensive and a logical plan is followed throughout. The basis of classification is a dual one, diseases being grouped by anatomical site and then subdivided according to etiology. A classification of symptoms is provided to permit uniform recording of the more important manifestations of diseases. Use of the *Nomenclature* is aided by an index which refers to every disease by all titles in current use.

The *Standard Classified Nomenclature of Disease* appears to be readily adaptable at no additional cost to any of the types of record systems in use, in small or in large hospitals, and should meet the existing needs of organized medical practice.

A.H.S.

Industrial Health Service. By L. D. Bristol, M.D., Dr.P.H. Published by Lea and Febiger, Washington Square, Philadelphia, Pa., 1933. 170 pages. Price \$2.00.

"Athlete's Foot is nothing less than ringworm of the feet with a college education". In this manner is the subject brought to the attention of the employees of the American Telephone

and Telegraph Company by Dr. Bristol, Health Director. This company is a pioneer in industrial medical service and stands in the front rank of its later development. Here the principles of preventive medicine are applied. This publication outlines how they may be applied in industries, large and small.

Part I outlines the scope of an industrial health service limiting industry's responsibility to health promotion with treatment of minor complaints only, emphasizing the importance of maintaining the physician-patient relationship, of the confidential nature of medical findings, of adequate records and of the need for an appraisal, not in terms of lost time reduction, but rather in terms of services provided and utilized.

Parts II and III present the details of health instruction from two points of view—for the use of foremen and other supervisors to enable them to detect errors in working conditions or in the personal hygiene of employees in order that appropriate advice may be given, and for the use of the employee himself. Under such circumstances some duplication is unavoidable, for the material presented may be applied by industry anywhere without direct medical supervision.

If this book reaches industrial executives and an attempt is made to apply the information so clearly set out, the development of health services, adequately supervised, will be greatly stimulated.

J.G.C.

Physiological Health. Volume IV of "Interpretations of Physical Education", School of Education series, New York University. Edited by Jay B. Nash, Ph.D. Published by A. S. Barnes & Co., 67 West 44th Street, New York, 1933. 308 pages. Price, \$2.00.

This volume is the fourth in the series now edited by Jay B. Nash, Ph.D., chairman of the Department

of Physical Education, dealing with various interpretations of physical education. To the ordinary reader physical education may only mean so much exercise, whether it be in drills, gymnastics, dancing or swimming. The author, however, discusses it in a broader way. Volume I dealt with the mind-body relationship. Volume III dealt with the problem of character building as an outcome of physical education. In this volume, physiological health is the objective desired from a properly planned and conducted physical education. Emphasis is rightly placed on the view that all the activities of the curriculum should contribute to physiological health. Health in this sense is defined as the ability of the body to sustain adaptive effort, *i.e.*, an ability to maintain a balance between the building up process and the breaking down.

This book consists of some thirty chapters, contributed by twenty-five authorities in their own subjects. In compiling the articles, Dr. Nash has arranged them in groups. Some deal with factors essential for building or maintaining physiological health, some with the physiological, psychological and other experimental sides of exercise, training, fatigue and recovery processes. Other articles have to do with the teaching of physical education, administration for health, and the book ends with a well selected bibliography. It is impossible in a short review to deal adequately with the many papers, but the book is obviously one that will prove interesting and instructive to all those interested in the teaching of physical education or the promotion of personal hygiene or health. It should be placed in all school libraries and brought to the attention of teachers, including those not specialists in physical training, as well as the principals or administrative officers who plan the school curriculum.

D. L. M.

The Sanitary Inspector's Handbook. By *Henry H. Clay, F.R.*

San. I., F.I.S.E. With an introduction by W. W. Jameson, M.A., M.D., F.R.C.P., D.P.H. (Lond.). Published by H. K. Lewis & Co. Ltd., 136 Gower Street, London, W.C.1, 1933. 386 pages. Price, 15/- net.

In a foreword to this volume Dr. W. W. Jameson, Dean of the London School of Hygiene and Tropical Medicine, speaks of the place of the well trained and competent sanitary inspector in every local health department and of the necessity of special training to equip him to do his work to his own and his local authority's satisfaction. Apart from the consideration of qualifying examinations, one of the essentials in such training is suitable handbooks. Mr. Clay has succeeded in presenting in one volume of reasonable size the manifold duties of a sanitary inspector. From a wide experience gained in health departments, and as lecturer in sanitary engineering in the London School of Hygiene, he has selected carefully the essentials and has presented them in an interesting and effective manner. The volume of 386 pages consists of thirty-one chapters and a feature of special interest is the use of almost a hundred excellent illustrations.

As an introduction, Mr. Clay traces the evolution of public health law in England and discusses the role of the sanitary inspector. The work, first, of inspection of premises and of districts is discussed, followed by a detailed discussion of lighting, heating, ventilation, water supplies, drainage and sewage disposal. Food control, including milk, meat and fish inspection, is presented in detail. The closing chapters relate to infection and disinfection, disinfestation and vital statistics.

Although the handbook has been prepared specifically for sanitary inspectors in Great Britain and contains a large amount of material that relates only to the conditions there, it will prove of real value to those qualifying for such work in any land. R. D. D.

Annual Report of the Rockefeller Foundation, 49 West 49th Street, New York, 1932. 455 pages.

It is only when one reads this report that one realizes the scope and influence of this wonderful institution. A list of the countries which have been assisted financially or in which health work or research work has been carried on embraces every country on the globe. The diseases on which research work has been carried out include yellow fever, malaria, tuberculosis, undulant fever, yaws, the common cold, typhoid fever,

etc. Canada has benefited greatly from help received from the Foundation. The provinces of Quebec, Alberta and Saskatchewan and the universities of Toronto and McGill have lately received valued assistance.

It is a source of satisfaction to all Canadians that a well known public health authority, a Canadian, Dr. J. G. Fitzgerald, dean of the Faculty of Medicine and director of the School of Hygiene and Connaught Laboratories, University of Toronto, is a member of this Foundation and one of the scientific directors of the International Health Division.

R.R.M.

**REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA*
BY PROVINCES
DECEMBER, 1933**

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	—	9	10	96	42	58	10	—	—
Scarlet Fever.....	—	31	36	427	658	92	23	19	204
Measles.....	—	1	—	78	31	18	422	4	17
Whooping Cough.....	—	52	4	499	222	192	79	25	38
German Measles.....	—	—	—	7	6	—	2	—	2
Mumps.....	—	—	—	690	251	9	15	—	119
Smallpox.....	—	—	—	—	—	—	—	1	—
Cerebrospinal Meningitis.....	—	—	—	1	2	—	1	—	—
Anterior Poliomyelitis.....	—	—	—	4	4	1	—	—	—
Typhoid Fever.....	—	—	3	48	21	—	4	6	3
Trachoma.....	—	—	—	—	—	10	1	—	3

JANUARY, 1934

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	6	13	4	79	29	51	4	—	1
Scarlet Fever.....	1	40	13	334	565	83	37	19	327
Measles.....	—	—	2	90	155	130	17	5	33
Whooping Cough.....	—	50	2	545	303	72	28	16	48
German Measles.....	—	25	—	13	12	—	1	1	3
Mumps.....	—	—	—	382	324	24	4	17	128
Smallpox.....	—	—	—	—	1	—	—	—	—
Cerebrospinal Meningitis.....	—	1	—	—	—	—	—	—	—
Anterior Poliomyelitis.....	—	—	—	1	1	—	—	—	1
Typhoid Fever.....	—	—	13	57	28	2	—	—	1
Trachoma.....	—	—	—	—	—	3	—	—	3

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

CURRENT HEALTH LITERATURE

These brief abstracts are intended to direct attention to some articles in various journals which have been published during the preceding month. The Secretary of the Editorial Board is pleased to mail any of the journals referred to so that the abstracted article may be read in its entirety. No charge is made for this service. Prompt return (after three days) is requested in order that the journals may be available to other readers.

Control of Amoebic Dysentery

Dr. McCoy states that we do not have sufficient information regarding the factors which govern the transmission of amoebic dysentery to permit of precisely directed and fully effective measures for the suppression of this disease and that there is insufficient basis for some of the drastic measures which are being put into execution. In addition to the reporting of all cases of dysentery and the provision of facilities in aid of diagnosis, the following measures are suggested: educational measures among all food handlers as to the necessity of personal cleanliness; elimination of all possible contamination of drinking water supplies by cross-connections and similar sources, particularly in hotels and public eating places.

G. W. McCoy, *U.S. Pub. Health Rep.*, 49: 359 (March 16), 1934.

An Appraisal of the Lead Hazards Associated with the Distribution and Use of Gasolene Containing Tetraethyl Lead

A study has been made of 301 men who had incurred the longest and severest exposure to leaded gasoline and its combustion products. No clinical evidences of lead absorption or lead intoxication were found in any individual. Comparison of the lead excretion of the subjects with that of corresponding groups of unexposed persons showed no indication of lead absorption resulting from the exposure. A number were studied before and after intense exposure and none showed increased lead excretion. Since the level of human lead excretion is highly sensitive to the magnitude of lead exposure and absorption, it is apparent that no significant absorption of lead occurred. If any absorption occurred, it was so light as to be masked by variations in the amount of lead ingested with food.

Robert A. Kehoe, Frederick Thamann, and Jacob Cholak, *J. Indust. Hyg.*, 16: 100 (March), 1934.

Limitations in the Attempt to Control Enteric Disease by the Examination of Specimens

Time and materials are expended fruitlessly when large numbers of specimens are examined as a routine procedure, without selection, from all food handlers and other persons engaged in occupations in which the carrier condition might render them a

menace. The authors feel that the findings do not justify the work or expense and quote a number of illustrative cases. For example, 2,169 specimens were examined from 866 food handlers in two hospitals and three carriers were found. Assuming the cost of examination of a specimen to be \$2, the expenditure of \$1,500 was required to discover one carrier.

The possibility of a false sense of security arising when only one or two specimens are examined and found negative is emphasized. A study of environmental factors, careful history taking and the submission of a series of specimens from food handlers with a history of enteric disease or association with cases of enteric disease would probably result in the detection of most carriers. Examination of all food handlers would, of course, remain necessary if the carrier is not found among those with suggestive histories and in certain types of outbreaks of enteric disease. In spite of the fact that unrecognized cases occur, the best method of control is detection of those cases which will become carriers.

It is suggested that the amount expended in indiscriminate examination of food handlers would yield a much greater return if expended in the improvement of sanitary facilities, provision for training in personal hygiene, careful examination of epidemiological factors and pasteurization of products wherever possible.

Ruth Gilbert and Marion B. Coleman, *Am. J. Pub. Health*, 24: 192 (March), 1934.

Fish Tapeworm Infestation in Eastern Canada: With Particular Reference to its Increasing Prevalence

It has been known for a considerable time that endemic areas in which fresh water fish are infected with the larvae of the fish tapeworm occur in Manitoba and the region of the Great Lakes. Human infestation with the adult worm is increasing in Eastern Canada, and in this study 50 cases admitted to three Montreal Hospitals are reported. Of these, 13 occurred between 1906 and 1928. Between 1928 and 1933, 37 cases were diagnosed. The increase appears to be related to the importation of fish from Manitoba. Haemograms of 40 cases and brief case reports of 10 cases are given. Treatment and methods of control and eradication are discussed.

H. B. Cushing and H. L. Bacal, *Canad. M.A.J.*, 30: 377 (April), 1934.

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